

Management of Dead Bodies in Disaster Situations

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**Area on Emergency Preparedness
and Disaster Relief**



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FOREWORD

Our Region has been the victim of different types of disasters that have had significant, long-term consequences for the development of communities, intensifying the poverty and increasing obstacles to progress, particularly among populations with scarce economic resources.

Death does not end human suffering, especially when death is sudden, as the result of a disaster. The death of a loved one leaves an indelible mark on the survivors, and unfortunately, because of the lack of information, the families of the deceased suffer additional harm because of the inadequate way that the bodies of the dead are handled. These secondary injuries are unacceptable, particularly if they are the consequence of direct authorization or action on the part of the authorities or those responsible for humanitarian assistance.

Regrettably, we continue to be witness to the use of common graves and mass cremations for the rapid disposal of dead bodies owing to the myths and beliefs that corpses pose a high risk for epidemics. The most serious aspect is that these measures are carried out without respecting identification processes or preserving the individuality of the deceased. Not only do these actions go against the cultural and religious practices of a population, but they have social, psychological, emotional, economic, and legal repercussions regarding the legacy of the deceased, which exacerbate the damage caused by the disaster.

The State has a critical role in standardizing and guiding the tasks of handling dead bodies (recovery, identification, transfer, and final disposal), ensuring that legal norms are followed, and guaranteeing that the dignity of the deceased and their families is respected in accordance with their cultural values and religious beliefs.

The Pan American Health Organization (PAHO) is pleased to present this manual, which will be very useful for authorities and those responsible for disaster prevention and response. It is our goal to ensure that the management of massive fatalities forms part of disaster preparedness and response plans, and that it is a fundamental aspect of humanitarian assistance to survivors and rehabilitation and reconstruction programs. In this way we can preserve the memory and dignity of those who have passed before us.

Mirta Roses Periago
Director
Pan American Health Organization



INTRODUCTION

“We should treat the dead with respect. In death, money doesn’t matter, material possessions don’t matter; dignity is what we should care about.”—statement by Gung Tresna, Lifeguard at Kuta Beach following the terrorist attack in Bali, Indonesia.

Major disasters occurring in this Region, regardless of their origin, have had one thing in common: an enormous number of fatalities. Hurricane Mitch in Central America, floods in Venezuela, the earthquake in El Salvador, hurricanes in the Caribbean, and disasters of human origin—such as the Mesa Redonda fire in Lima, wars, or aviation accidents, to name a few—have resulted in many deaths. Each disaster has yielded important evidence about handling bodies, particularly when the number of dead overwhelms the capacity of a country to effectively respond to an emergency.

Immediately following the onset of a disaster, it is essential for national, regional, or local authorities to concentrate their actions and resources on three basic activities: first, the rescue and treatment of survivors; second, the repair and maintenance of basic services; and, finally, the recovery and management of bodies.

Controversy has always surrounded the handling of mass fatalities. Myths about treatment of the dead are strongly rooted in culture. Contemplating massive measles vaccination campaigns after an earthquake because of the fear that corpses could transmit this disease, or burying or incinerating corpses without completing required identification processes because of the supposed contamination risk they pose, are just two examples of the myths that form part of the popular culture. Despite efforts by experts to dispel these and other beliefs, certain fallacies have led and continue to lead to unacceptable practices in managing dead bodies. For example, after the earthquake in India in 2001, in which the number of fatalities approached 100,000, the bodies recovered were cremated. The wood supply was quickly exhausted, leaving the survivors without enough fuel for cooking or heating.¹

Considering these factors, PAHO’s Area on Emergency Preparedness and Disaster Relief has developed this manual as a tool to be used by national and local authorities and professionals from public institutions that are affected by this issue.

This manual provides the technical information that will support the correct approach to handling dead bodies, taking into account the following principles:

- ◆ When death is the result of a disaster, the body does not pose a risk for infection;
- ◆ Victims should never be buried in common graves;
- ◆ Mass cremation of bodies should never take place when this goes against the cultural and religious norms of the population;

¹ de Ville de Goyet. “Stop propagating disaster myths”. *Lancet* 2000; 356:762-4.

- ◆ Every effort must be taken to identify the bodies. As a last resort, unidentified bodies should be placed in individual niches or trenches, which is a basic human right of the surviving family members.

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Mary Elizabeth Stonaker edited the final English version of the manual under the general supervision of Ricardo Pérez of the Area on Emergency Preparedness and Disaster Relief of PAHO/WHO.

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CHAPTER 1: PREPAREDNESS FOR MASS FATALITIES

The management of dead bodies involves a series of activities that begins with the search for corpses, in situ identification of the body, transfer to the facility that serves as a morgue, delivery of the body to family members, and assistance from the State for final disposal of the body in accordance with the wishes of the family and the religious and cultural norms of the community. It requires the involvement of a diverse team of people, including rescue personnel, forensic medicine experts, prosecutors, police, administrative personnel, psychologists, support teams for the personnel who are directly handling the bodies, representatives from nongovernmental and international organizations, as well as community volunteers. The State must manage this activity with utmost conscientiousness and professionalism, covering all the aspects mentioned above. The health sector should take the leading role in addressing concerns about the supposed epidemiological risks posed by dead bodies, and by providing medical assistance to family members of the victims.

INTRODUCTION

In disaster situations, the State and its authorities are responsible not only for being prepared to effectively provide immediate assistance to disaster victims and to maintain basic services following an event. It is also the State's responsibility to attend to the handling and final disposal of dead bodies resulting from the disaster, regardless of their number.

In many cases, management of human remains has not been given the attention it deserves, and has even been disregarded. It is important to clarify that the priority is to assist disaster survivors and to maintain basic services, but we cannot overlook the recovery of dead bodies.

This chapter aims to provide a general overview of the authorities' obligations in dealing with this issue. The State must assume the leading role in the entire process, that is, to organize health services, legal services, forensic services, and the other actors involved in managing dead bodies. Without neglecting resources destined for the living, there must be an integrated plan to serve the needs of the dead. One must always keep in mind that the way corpses are managed has a significant impact on the wellbeing of surviving family members.

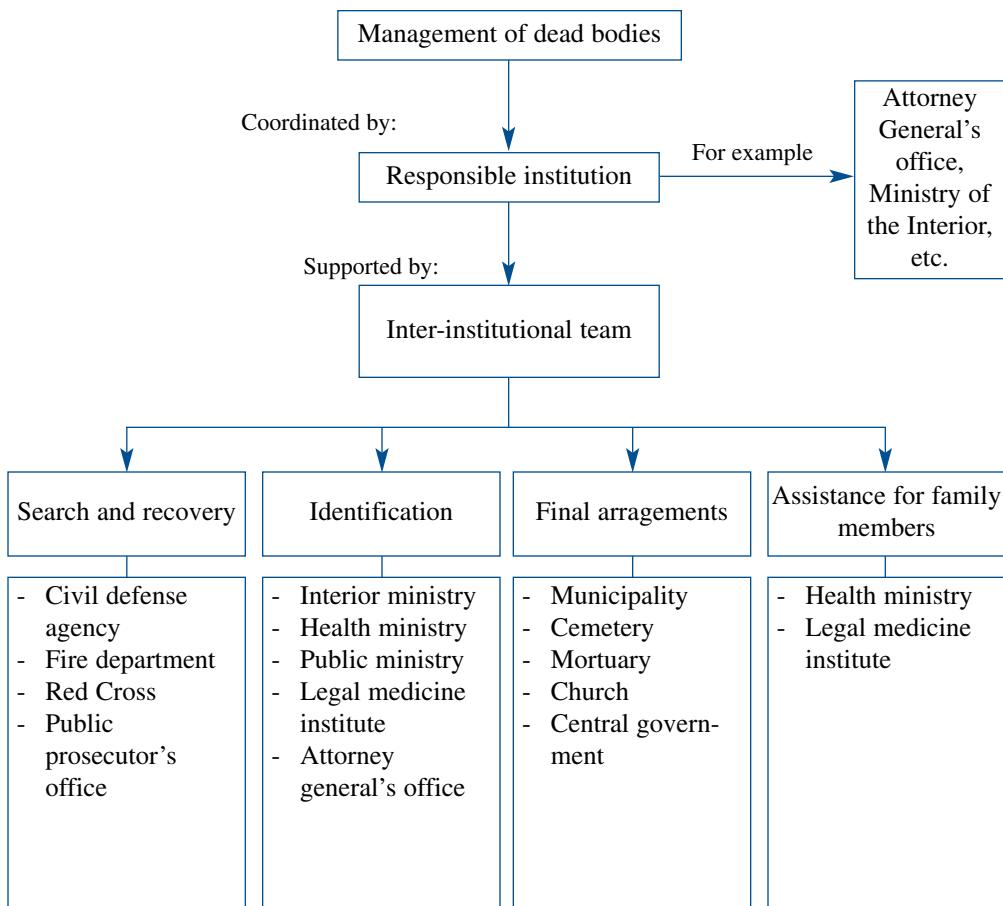
COORDINATING INSTITUTIONS

The management of dead bodies involves a series of activities that begin with the search for corpses, in situ identification of the body, transfer to the facility that serves as a morgue, delivery of the body to family members, and assistance from the State for final disposal of the body in accordance to the wishes of the family and following the religious and cultural norms of the community. It requires the involvement of a diverse team of people, including rescue personnel, forensic medicine experts, prosecutors, police, administrative personnel, psychologists, support teams for the personnel who are directly handling the bodies, representatives from nongovernmental and international organizations, as well as community volunteers.

There should be adequate coordination among all of the actors to avoid misuse of resources or duplicated efforts. To that end, one of the tasks of the Emergency Operations Committee of a country should be the management of dead bodies in disaster situations. If this function is not assigned by law to an institution that is a member of the Emergency Committee, the responsible institution should be specified (for example, the public attorney's office, the public ministry, judicial branch, health ministry, etc.)

The responsible institution should coordinate other institutions in their respective tasks related to handling the dead. The services of all relevant institutions, including psychological counseling for relatives, should be immediately available (on a daily, uninterrupted basis) after a disaster strikes. Typically, this coordinating role falls to the attorney general's office, judicial entity, or another public agency responsible for a State's internal security. Failure to provide this coordination will negatively affect the entire process of managing dead bodies during a disaster.

To cite an example, an aviation accident occurred in one of the countries in this Region on a holiday. The public offices were closed, and there was no one in the registry office to help with the legalities of identifying the bodies and providing death certificates. It was necessary to wait until the next business day to complete necessary legal transactions.

Table 1.1. Administrative structures for management of dead bodies

Duties

The most important task is to coordinate work among the different institutions. The activities outlined below will facilitate this coordination:

- ◆ *Provide effective leadership.* A law or regulation should clearly specify the coordinating institution. Lacking this, the Emergency Operations Committee must assign this function to an appropriate institution. Moreover, it is essential that everyone involved understand his or her responsibilities.

For example, following the aviation accident in Chachapoyas, Peru, the Public Prosecutor's Office led the process of recovering bodies, as stipulated by law.¹

¹ Judith Maguiña Romero, Medical Examiner, Instituto de Medicina Legal (Legal Medicine Institute) of Peru.

- ◆ *Create a governing body.* The governing body includes representatives from all of the relevant agencies, and is the best way to ensure coordination among them.
- ◆ *Determine intervention priorities.* These priorities may change according to the type of disaster and the actual situation.

For example, following the landslide caused by the Casitas Volcano in Nicaragua, the condition of the terrain made it difficult to recover the bodies, and posed a hazard to rescue personnel. The decision was made to wait to recover the bodies until conditions improved.²

- ◆ *Prevent duplicated efforts* and ensure that all needs are met. Each institution should have a specific task in the process.
- ◆ *Communicate effectively* among institutions and with the community. The governing body should use the necessary communications media. Official spokespersons are responsible for providing information about bodies that have been recovered and identified. During an emergency, the first 24 hours are critical, so a quick response is necessary. A realistic assessment should be made of the situation and communicated to the media and to the general public: not providing this information gives rise to rumors and misrepresentation of the actual situation. Official spokespersons play a critical role in the management and credibility of the information provided; they should be experienced in dealing with the media and, when possible, be members of the Emergency Operations Committee.
- ◆ *Develop uniform procedures.* Common standards and guidelines should encompass the entire process. These protocols or guidelines should be applied from the moment the corpse is located, through the process of identification and delivery of the body to the family. They should also address procedures to be followed in psychological and legal aspects following the tragedy (see Chapter 2).

Preparation of the plan

In general, plans to manage mass fatalities in disaster situations should accomplish the following.

- ◆ Assess the current situation, taking into account:
 - Human resources who are trained and available to handle, identify, and dispose of the bodies;
 - Financial resources budgeted for emergency management and the funds designated for managing dead bodies;
 - Logistical resources and materials.
- ◆ Identify possible emergency scenarios, considering:

² Zácarías Duarte, Forensic physician, Instituto de Medicina Legal de Nicaragua.

- Types of disasters that are most common in a region, and probable number of associated fatalities;
- Access to resources at the time of the emergency, including volunteers for the recovery of bodies, refrigerated containers to serve as temporary morgues, space for burial of the dead, and availability of extra-budgetary funds.
- ◆ Determine features of administration for disaster response such as the institutions and officials involved in decision-making and establishment of a special committee to oversee management of dead bodies. The plans should not be highly detailed, since situations change according to the type of disaster. Expect the unexpected, and allow for a certain amount of improvisation.
- ◆ Subdivide the plan into independent components. Effective response does not require all specialized personnel (for example, morgue administrators) to be familiar with all aspects of the plan.
- ◆ Circulate the plan widely. Everyone involved in handling dead bodies should be familiar with this plan, especially with sections relating to his or her role during an emergency. The plan requires continual training, particularly regarding teamwork rather than in the professional proficiency of individual team members.
- ◆ Conduct periodic exercises to test the plan. Failure to carry out simulation exercises can nullify the validity of the best of abstract plans.
- ◆ Use basic demographic and epidemiologic data provided by the country's Emergency Operations Center as supporting material.

TECHNICAL PROGRAMS

When planning for the management of dead bodies, identification of bodies, epidemiologic surveillance and disease control, training, and simulations must be considered, as outlined below.

Body identification

The Department of Legal Medicine plays a fundamental role in this area. As detailed in Chapter 2, forensic or medicolegal institutes have protocols for identifying and preserving bodies, certifying deaths, and transporting bodies locally and internationally (when necessary). Good performance in this area requires superior teamwork between the medicolegal, public prosecutor (or comparable officials), judiciary and health entities.

Epidemiologic surveillance and disease control

The type of disaster determines the levels of morbidity and mortality of the affected population. As part of the epidemiologic surveillance system it is advisable to

institute warning mechanisms with the list of possible illnesses related to each type of disaster; establish a simple system for gathering data; and launch special programs such as vector control and treatment of gastrointestinal disease or nutritional disorders. This response cannot be improvised, and it is the responsibility of the Epidemiology Department and the health services to be prepared to confront these issues in an emergency situation.

It should be noted that in areas where certain diseases are endemic, the disposal of bodies may become a priority. However, even in such cases the presence of dead bodies should not be considered an important public health risk. There is little evidence to suggest that human or animal corpses are a risk in areas that are not endemic for certain diseases (see Chapter 3).

Training

All institutions involved in management of dead bodies should introduce basic training programs. Personnel should receive specific instruction on different aspects of handling dead bodies, including: search and recovery techniques; public hygiene of the population at risk; and social, cultural, religious, legal, and psychological characteristics of the community. Institutions should offer ongoing training in disaster management topics that relate to their respective areas of responsibility.

Lack of training can have negative consequences for the authorities and personnel charged with managing the bodies. For example, hurried forensic work done without sufficient expert staff and in hazardous situations can have long-term effects. Insufficient documentation about the bodies and the scene, increased costs owing to the need to repeat the work, and loss of evidence or valuable information will generate distrust in the services.

The importance of having adequate resources in mass casualty situations can be demonstrated by a case in Colombia when an ambush by insurgents resulted in the deaths of 62 soldiers in the El Billar area of Caquetá in March 1988. The bodies were transferred to the closest army base and underwent autopsy by a single physician. An unexploded grenade was found hidden in one of the bodies, so the site had to be evacuated while specialists were summoned to defuse the device. Death certificates were expedited for certain victims who were identified by their fingerprints, and these bodies were returned to family members. Because of doubts as to the identities of the deceased, the remains of 14 individuals were exhumed after seven months. Second autopsies were conducted, dental records requested, and DNA samples were taken. The bodies had been buried and covered by large amounts of sawdust, and their preservation was remarkable considering the tropical climate. Eighteen months after the battle it was possible to identify all of the victims through genetic sampling.

The availability of technical infrastructure, experienced investigation and forensic teams, and preparation will produce markedly different results. An

example of this was the investigation of an attack made on the exclusive El Nogal club in Bogotá in February 2003, when a car bomb exploded in the garage of the building. Thirty six victims were identified, a team rapidly carried out complete autopsies, and the bodies were delivered to families. The main difficulty reported in this case was lack of coordination among institutions. Methods used in a “unified command” structure were proposed as a solution to the problem

Training should not be limited to the institutions directly involved in managing dead bodies. It may be even more important for professional training institutions (universities, schools, etc.) to include topics about disaster preparedness and response in their regular programs or as part of continuing education programs.

All sectors should be encouraged to develop research protocols in their respective fields. This would help to identify factors that would improve disaster management or the effects of the disaster on the population.

Simulations

Simulations should be carried out with the participation of authorities and operative personnel. These exercises are the only way to keep plans up-to-date, especially during the long periods when there are no emergency situations. Types of exercises are outlined below:

- ◆ *Table-top exercises* use scenarios illustrated in print or on computers. Their objective is to improve coordination, share information, and test decision-making processes.
- ◆ *Field exercises* test a disaster plan in simulated field conditions. These exercises cannot realistically reproduce the dynamics and chaos of actual disasters, but they are very helpful in revealing errors that inevitably occur, the lack of coordination, or shortcomings in the simulated response. A critical evaluation at the conclusion of the exercise is essential. A perfectly executed field simulation is one that reveals many defects in the disaster plan.
- ◆ *Training exercises* aim to provide specific skills to technical personnel (for example, search and rescue personnel might receive training in recovering and handling dead bodies, body identification, and providing psychological assistance to families). A perfectly executed training exercise is one that results in the flawless repetition of a specific task under any circumstances.

RELATIONS WITH THE COMMUNITY

Following a major disaster, the need for search and rescue, first aid, and body recovery is likely to be so great that the organized relief services will be able to deal with only a small fraction of the demand. Most immediate help will come from uninjured survivors. Improvement in the quality and availability of immediate first aid

services depends on increased training and preparation obtained through specialized agencies (for example, through courses taught to volunteers by fire brigades).

An information center must be established to respond to the questions of family members and friends of the missing or dead. This center should have sufficient staff so that it can operate around the clock.

Priority must be given to victim identification, which is becoming an increasingly specialized issue. Every attempt should be made to identify the bodies at the site where they are found. Tags should be attached to the bodies that provide the name (if known), approximate age, sex, and location of the body (see Chapter 2). These tags should be standardized and designed in advance as part of the national disaster plan. Health personnel should be completely familiar with their proper use.

Adequate mortuary space and services must be available, as well as sites for the final disposal of bodies.

RELATIONS WITH THE MEDIA

The media play an important role in providing critical information to the affected population and to national and international audiences in the event of a disaster. It is essential that authorities and media practitioners share an understanding of the objectives of information dissemination, as well as their respective roles in the disaster. Managing information about fatalities is of particular importance in this regard. As part of national disaster planning, it is important to hold regular meetings or seminars between the members of the media and disaster managers to clarify these roles and responsibilities and to emphasize the ethical and moral obligations to provide accurate and timely information.

The following recommendations have been adapted from the chapter written by R. Elliott Churchill in the book *The Public Health Consequences of Disasters*.³

Questions commonly asked after a disaster

- ◆ What happened?
- ◆ When and where did it happen?
- ◆ How many victims were there? Who were the victims??
- ◆ What caused the disaster?
- ◆ What are you doing to take care of the situation?
- ◆ When will recovery operations begin?
- ◆ Who is in charge of recovery operations?

Guidelines for the official spokesperson

- ◆ Do not give names of the dead until next of kin have been officially notified.

³ R. Elliott Churchill, "Effective Media Relations" in Eric K. Noji, ed. *The Public Health Consequences of Disasters*, (New York: Oxford University Press, 1997; pp. 126-128).

- ◆ Avoid speculation and personal opinion.
- ◆ Always tell the truth. If you do not know the answer to a question, admit it.
- ◆ Prepare a brief written statement about the situation and provide it to media representatives (include background information, photographs, and audiotapes or videotapes if appropriate).
- ◆ Do not give exclusive interviews. Schedule a press conference with all the media representatives and give them all the same information at the same time. If you are going to read a prepared statement and not answer questions until later, say so at the beginning of the conference.
- ◆ Be as accessible as possible to take follow-up questions from the media so they don't think you are avoiding them.
- ◆ Stay calm.

Proactive approach to media relations for the official spokesperson

- ◆ Do not wait for the media representatives to contact you. Study the patterns and type of reporting done in your area and determine which media seem to be the best informed, the most responsible, and the most effective, and contact them. Begin with one representative and contact others after you have gained some experience.
- ◆ Write and state clearly and consistently not only the facts, but the message you want to convey.
- ◆ Explain in each interview the importance of the issues you have discussed and how they fit into the general context of public health practices.
- ◆ Do what you can to maintain an image of sincerity, experience, and candor.
- ◆ Respond to the media when they contact you. They remember who helps them and who does not.

CONCLUSIONS

Handling and identifying dead bodies that result from a disaster should not be viewed as isolated actions but should be included as an integral part of disaster response.

Preparedness should begin by ensuring that the institution or authority responsible for coordinating all aspects of managing dead bodies is a member of the Emergency Operations Committee. If the law does not designate the responsible institution, the Emergency Operations Committee should delegate this function to the most competent institution. In the majority of countries this responsibility falls to the public prosecutor's office or the justice department.

The most important goals of the program are to coordinate work between different institutions by means of effective leadership. A governing body will assist with determining priorities for intervention in accordance with the kind of disaster, and fostering effective communication with the population through the media.

When developing the disaster plan, existing resources and level of preparedness must be assessed in terms of the type of disaster most likely to occur and the number and kind of victims that might result.

In the first minutes and hours after a major event, organized relief services may be overwhelmed by the needs for search and rescue, first aid, and recovery of dead bodies. Most immediate help will come from uninjured survivors. Improvement in the quality and availability of immediate first aid services depends on training and preparation obtained through specialized institutions.

The communications media play an important role in disaster situations since they provide critical information to both national and international audiences. National authorities must effectively deliver information to members of the media through official spokespersons, thereby limiting misleading reports and rumors.

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CHAPTER 2: MEDICOLEGAL WORK IN MAJOR DISASTERS

Jorge González Pérez*
Alicia Marienne Basant Montesinos**

There is no justification from the medicolegal standpoint not to follow all scientific procedures for the recovery, transfer, identification, and final disposal of the remains of disaster fatalities. A select group of experts who are experienced in these procedures should oversee the process. However, in situations where experts are not available, the community physician should take leadership and make use of all available resources to carry out these tasks.

INTRODUCTION

The composition of a team to manage mass fatalities in disaster situations will vary from country to country, region to region, and from event to event, depending on many factors. Some of these factors are: the availability of qualified people who are physically able to do the work, the availability of essential materials and equipment, the response capacity of the affected country, the specific conditions at the disaster site, and how knowledgeable the decision-makers are about the policies governing management of mass fatalities.

The work of handling, identifying, and disposing of dead bodies is based on forensic sciences and requires a multidisciplinary team. It is important to emphasize the close association that should exist among the professionals who perform this work. However, it may be impossible to mobilize a qualified team so it is necessary for the acting physician to understand the most important principles of managing dead bodies, and, in the absence of medicolegal experts, to carry out these tasks to the best of his or her abilities.

Texts about forensic medicine and forensic anthropology or criminology will provide the necessary information for handling dead bodies. It is not our purpose to explain how to determine the cause of death or how a forensic anthropologist establishes the identity of a corpse. While such expertise is necessary to effectively deal with mass fatalities in emergency situations, it is the domain of specific sciences. Our main objective is to guide readers through the necessary steps to organize the agencies dealing with the complexities of an emergency, and to alert those involved in disaster preparedness about the important organizational and managerial aspects of managing mass fatalities.

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ORGANIZATION OF NECESSARY PERSONNEL

Organization and preparation of the team

As mentioned above, the composition of a team to manage mass fatalities in disaster situations will vary from country to country, region to region, and from event to event, depending on many factors and conditions. Some of the factors that affect the process are the availability of qualified people who are physically able to do the work, the availability of essential materials, the specific conditions at the disaster site, and how knowledgeable the decision-makers are about the policies governing the process.

Notwithstanding the variety of conditions, there are certain premises that should be followed so that the organization and preparation of work done by medicolegal specialists is successful. They can be summarized as follows:

- ◆ Ability to rapidly locate and mobilize the team;
- ◆ Minimal need for material resources;
- ◆ Adaptability to difficult working conditions;
- ◆ Support from local health services and other institutions;
- ◆ Rapid and effective information processing; and
- ◆ Unified command in cooperation with the other participants.

The essential planning tasks include: development of an emergency plan that describes the distinguishing characteristics of the region or area; taking preventive measures that are based on the risk and vulnerability studies made of a particular location; and actions that individuals must take depending on the situation.

The basic objective of the health services is to save as many lives as possible in a disaster, or at least to reduce to a minimum the possible injuries and illness associated with the conditions following an event. In medicolegal work, the objectives are different; they are to:

- ◆ Legally determine or pronounce *death*;
- ◆ Recover the remains of the dead;
- ◆ Establish *identity* of the dead;
- ◆ Estimate the *time of death*;
- ◆ Determine the cause of death;
- ◆ Explain the possible *circumstances* of death;
- ◆ Prepare the remains for final disposal; and
- ◆ Study the event to assist in *prevention* in the future.

Considering all of the above, there should be close cooperation among the professionals and experts that perform this work, or in the absence of a team, the acting physician should understand these basic principles of managing dead bodies to carry out these tasks to the best of his or her abilities.

Formation of the group and the warning plan

The composition of the medicolegal working group for managing mass fatalities in disaster situations varies according to the actual conditions and the human resources available at the disaster site. However, at a minimum there should be one specialist in forensic medicine on the team; ideally, he or she will have specific training in managing this type of disaster. Pathologists and teachers of anatomy from medical institutions, if available, can complement forensic medicine specialists on a team or, in their absence, can replace them. Surgeons, orthopedists, and support staff in these specialties may assist if conditions permit. Also important are mortuary personnel, gravediggers, or anyone with experience in routinely handling the dead.

Although generally a parallel group, the medicolegal working team will have an important relationship with firemen, criminologists, and police medical examiners, as well as with search and rescue personnel. While the latter generally look for survivors, it is not unusual for them to find dead bodies and remove them from the disaster site. Search and rescue personnel may not be prepared to handle situations where there is doubt about whether a subject is still alive, and the information they can provide to the medicolegal team in such cases is particularly valuable.

The warning phase of the plan should be developed considering available communications systems, but there must be alternatives assuming that there will be power failures or other malfunctions that prevent them from working. The person-to-person contact chain is the safest way to inform, locate, and summon personnel and should be included in the plan. Individuals in the contact chain might be missing, and it is necessary to go to the next person so that the chain is not broken. The plan must specify whom to contact in such a case. This should all be addressed during the planning stage and, if possible, it should be tested systematically during simulation exercises.

Risk and vulnerability studies

There are technical publications that give detailed information about risk and vulnerability, and it is essential for disaster workers to be aware of the main events or emergencies that are most likely to occur in their region. These include natural events such as storms, volcanic eruptions, earthquakes, floods, tidal waves, storm surges, avalanches, and landslides, to cite a few examples, as well as events caused by human activity such as traffic and aviation accidents, armed conflict, fire, building collapse, gas leaks, chemical spills, and nuclear disasters, among others. Precise knowledge of the vulnerabilities and risks of the region or zone enables effective preparation for emergencies that will require a medicolegal response.

A risk map of the region should be available that analyzes a variety of important factors, for example, wind direction in the case of gas leaks, possible evacuation zones when rivers are flooded, the safest buildings, sites that could be used for the placement of dead bodies, and the location of radioactive materials, to cite a few examples.

Technical preparation of personnel

Once the medicolegal team is formed, a technical preparedness plan should be developed using knowledge of the most common hazards in a region or territory and considering available resources (human and material). The plan should be based on the work objectives already defined for these emergencies, that is: diagnosis of death, recovery of human remains, identification, establishing time of death, causes and circumstances of death, and preparation of the remains for their final disposal. It is also important to address how to prevent similar events in the future. This plan should address the principle medicolegal problems that we would face in a specific type of disaster in a particular place.

Cooperation agreements

When facing a disaster we must also incorporate community resources, including scientists and professionals who have specific roles in the community. Nothing should be left to chance: all aspects of disaster response should be taken into account with well-planned and comprehensive cooperation agreements made before an emergency occurs.

Agreements should be made with the appropriate individuals or groups regarding the following:

- ◆ Necessary personnel;
- ◆ Work sites;
- ◆ Instruments, equipment, and other material;
- ◆ Transport and communications;
- ◆ Water, food, resting areas, and first aid stations;
- ◆ Refrigeration and preservation measures;
- ◆ Information management.

Thus, in anticipation of a disaster, we should consider potential temporary locations for medicolegal tasks, which in an emergency might include sites usually used for other purposes (for example, warehouses, sheds, farms, meat-packing plants, or sports fields). Arrangements should be made with specialists (surgeons, veterinarians, and biologists, among others) who have other occupations during normal times to support the work of managing mass fatalities. Provisions should also be made to coordinate water and food services, as well as waste collection and disposal. These important facets of handling dead bodies should be agreed on before a disaster strikes.

Other essential items that should be included in agreements with participating institutions and individuals are: transport and refrigeration; communications; availability of backup generators should the need arise and/or connection to the electrical system serving temporary shelters and work areas; and effective management of information about the event.

Exercises and simulations

One way to evaluate and perfect a disaster plan is to conduct simulations and exercises that are as close as possible to the theoretical plan conceived by specialists. This is particularly important given the number of teams and individuals who are involved in a disaster and the variety in their backgrounds.

Certain things can be tested during a disaster simulation, for example: the time required for carrying out the warning phase of the plan, the logical sequence of tasks, circumstances for transport of human remains, the capacity of a specific facility to receive bodies, and procedures for security and control of access. Most important is the knowledge and understanding shown by the principal actors, and the real potential for putting the plan into practice.

In addition to the plans themselves, the simulations and exercises should be well conceived and studied before executing them. An exercise that is improvised or superficially performed can result in errors of interpretation and a loss of confidence in correctly planned measures.

In general terms, we can use different classifications for the exercises:

- ◆ *Actions*, for example, the warning plan and collection of information;
- ◆ *Forces*, such as rescue personnel and public safety officers;
- ◆ *Measures*, such as transportation and communications;
- ◆ *Possible sites*, that is, appearance as well as location of temporary accommodations;
- ◆ *Totality of actions*, forces, measures, and possible locations.

After each exercise, the plans should be reviewed and adapted, correcting aspects that proved to be unworkable by substituting them with more feasible ones.

For medicolegal work, it is important to inspect sites that might be used in the event of a disaster with mass fatalities. Medicolegal institutions and morgues, many of which are located inside community hospitals, might not survive certain events because of structural damage to the facility. For this reason, it is not unusual to have to use sites for both the reception and storage of bodies, or to move all of the activities to these temporary locations and disregard existing morgues. Good planning will anticipate the preparation of such locations.

Simulations have shown inadequacies in plans for transporting dead bodies. For example, one plan for using buses was approached as if the buses were going to transport survivors, which would be unfeasible. Also, plans for vehicles to evacuate the injured were impractical given the condition of the patients and the urgency needed to transport them. These examples underscore the importance of conducting simulations in each site.

Many exercises are first made in theory, on paper. We should be aware of the costs involved in carrying out an actual comprehensive exercise. Such an exercise should only be undertaken when all of the activities outlined in the theoretical plan are very well defined. The plan must be adapted to the reality of specific locations and situations represented in risk and vulnerability maps.

Material needs

Once an event that causes a disaster occurs, immediately needed resources must be mobilized. These resources will be in direct relation to the type of event, its magnitude, its effects, and, logically, the response capacity of the affected region or country, which could affect requests for external help, including international assistance.

If there has been adequate preparation, the material needs following a natural disaster should be well identified. External assistance in the form of supplies or specialists may be necessary when the magnitude of an event and the high number of deaths overwhelm the capacity of local responders. Requests for this assistance must be made quickly, either directly to the national authorities or through national authorities to the international community. While the response may be rapid, it will always take longer than the affected population expects.

The type of event has a major influence on the ability to respond, particularly in terms of managing mass fatalities.

For example, in the case of a hurricane with strong winds but without flooding, it is likely that there will be few deaths and, typically, the storm will be short-lived. In the case of a hurricane that causes flooding and landslides, the number of deaths may increase significantly. Owing to weather conditions and the likely disruption of transportation routes, rescue of survivors and recovery of bodies could be very difficult.

In sudden-impact events such as earthquakes, the number of dead is likely to be very high from the outset. Telephone, water, gas, and electricity services may be abruptly interrupted, and short circuits and gas leaks may cause fires, increasing the number of victims. These factors can overwhelm the health services, particularly where there is physical collapse of health facilities and will affect autopsy rooms or sites designated in emergency plans as temporary morgues.

These considerations apply to each type of event and vary according to existing conditions at the time of a disaster. The situation of a specific region, that is, the level of development of local and national infrastructure, influences the response. It is not possible to propose a formula for response: actions must be assessed for each individual case.

Whether dead bodies are recovered early in the rescue process or, in extreme cases, have reached the stage of putrefaction by the time they are recovered, completely changes the nature of the medicolegal work. Other factors affecting this work include complicated searches for buried bodies, for example as a result of landslides or avalanches; cases when the integrity of the bodies is compromised and visual recognition is difficult, particularly as a result of fire or building collapse; or situations where it is very complex to reach the body, as in the case of earthquakes.

The materials needed to manage mass fatalities change with each scenario. There may be greater requirements when there are body fragments, oftentimes burned, as almost always happens in aviation accidents or even traffic accidents. Sometimes res-

cuers must dig for days to find bodies buried in avalanches or landslides. Whether the situation is complicated or classified as simple because all of the bodies are visible and well preserved (if the term “simple” can apply in a mass fatality incident), there are basic requirements. The majority of these are addressed in the following sections.

Transport

Transport is needed for the specialists and support personnel required to deal with the mass fatalities, as well as for moving body bags, stretchers, a basic complement of instruments, equipment, water, food, tents or other temporary shelter, and electrical generators, among other items.

Once dead bodies have been removed from the site, specialized or mortuary transport will be needed. In most major disasters the availability of specialized vehicles is quickly exhausted and has to be improvised or adapted to meet the demand. In many countries adaptation is a standard practice, but in some areas there are regulations prohibiting the use of certain types of vehicles to transport dead bodies. Negotiations should be made in advance with authorities to avoid problems in this regard.

When adapting vehicles to transport dead bodies, it is advisable to use trucks or vans, preferably closed, with floors that are either waterproof or covered with plastic. The bodies or remains should have already been packed in duly marked body bags or other containers. This is addressed in more detail in the section on transfer of bodies and body parts.

To the extent possible, cover any lettering or symbols, including license plates, that identify the companies or individuals who own the vehicles being used to carry human remains. This is to avoid, among other problems, possible prejudice or negative repercussions for the owners should pictures of the vehicles be taken by the press and distributed.

Vehicles must be thoroughly cleaned once transport is completed, or when refrigerated vehicles are no longer required. The responsible epidemiological or health authority should certify cleanliness of the vehicle before it is put back into routine use. This certification is particularly important for refrigerated vehicles or “Thermo” type containers that can be used for preserving human remains, a topic that we will return to later in this chapter. Certification, besides being a guarantee that the work has been done, serves as legal protection for businesses or other entities from possible claims related to their services, especially if the routine use of the vehicles is to transport food, medicines, or even flowers, among other items.

Using health service vehicles—specifically, ambulances—to transfer human remains from the site of the disaster is ill-advised, even though it is a common practice. Even worse is the transfer of individual bodies in a situation where there are mass fatalities. Using high speeds, sirens and other measures to gain right of way in traffic when carrying dead bodies is reprehensible: medical emergencies that save lives should never be confused with the urgency of medicolegal examination of the dead.

Rational use of resources takes on greater importance in emergency situations and is one of the reasons for using health service vehicles and ambulances only to trans-

fer the injured and ill. Even in the absence of injured survivors, as in the case of aviation accidents with no survivors, using ambulances to transport human remains cannot be justified. Trucks, pick-ups, and vans should be used to carry human remains. Once identified, the bodies should be transported in mortuary hearses that are specialized for this purpose.

Communications

Communications are vital in routine life and they become critical in disaster situations. Current technological advances in this field favor a variety of communications systems. Minimal communications measures must be available in an emergency situation: first, to learn as much as possible about what has happened in an emergency and, second, to maintain information about the emergency, particularly when there are risks of worsening conditions for the population and relief personnel on the ground, including forensic experts.

Any number of communications devices can be deemed necessary, but may prove to be inadequate to meet our needs. These include fixed or cellular telephones; the beeper or locator to mobilize necessary personnel; using radio, fax, e-mail, and the Internet with all of their possibilities to satisfy information needs; and, finally, satellites such as the Planet One system.

Communications measures allow us to know what has happened while allowing us to transmit timely information to people at risk and to survivors. Recovering basic data that will help in identification in mass fatality situations is possible in part because there are adequate communications, including between countries.

For medicolegal work, the first thing to find out is the number and, if possible, the identity of persons who might be the victims of a disaster. Using this information as a starting point, it is possible to activate the plans for managing dead bodies. The potential number of victims gives an idea of the resources to mobilize. It also gives an idea of how to find necessary information for identification, a priority in disaster situations.

Walkie-talkies are helpful when organizing work at a disaster site in large, open spaces, without fixed communications between points. Radios that do not require manual operation (hands-free communicators) are effective for maintaining permanent contact with personnel working at the disaster site. This is especially important when the number of victims is very high and rescue personnel have to cover a large area.

In areas where bodies are stored, examined, and identified, and in other places where medicolegal work is done, the availability of an effective communications network is essential.

Developments in computers, in particular the emergence of the Internet and electronic mail, make it possible to transmit large quantities of information—text as well as large format images—at a low cost using minimal telephone time. This has turned out to be an important advance for forensic practice. It is possible to use very modern communications methods with cellular phones connected to computers and to satellite services (such as Planet One) even when working in rural areas or in com-

plex scenarios. While very expensive at this time, we hope that these services will be accessible to all of us in the future.

When gathering information it is very important to have sufficient computers in a network to simultaneously develop two databases. One is based on information about presumed victims (ante-mortem data) obtained from official sources, from relatives, and others who are investigating missing persons. The second database is of the human remains undergoing examination and is generated with data from individual exams on bodies or body fragments (post-mortem data). A computer network, therefore, is highly desirable in disaster situations.

In the absence of a computer network, the classic system using cards with perforated edges (“key-sort” cards) is satisfactory. While the work will not be done as quickly, and continuous contact with other authorities will be lacking, the cards do make it possible to do the task in an organized manner with relative ease, regardless of the number of victims.

Protective clothing and equipment

Depending on the type of disaster and the working conditions where dead bodies are handled, it might be necessary to have clothing that is suited to special conditions. In general, however, clothing normally worn in operating or surgery theatres or autopsy rooms is adequate. Conventional work clothes may be suitable depending on the type of terrain at the work site.

Disposable clothing is available and is recommended for many situations. In other cases, traditional fabrics are preferable owing to their strength especially when lifting bodies. Closed, boot-style shoes are also recommended in these instances. Moving bodies is inevitable in most cases, and even though there will be assistants, wearing back-support belts can reduce the chance of injury. Rain gear is also useful in case of storms.

In general, although the use of face masks is recommended in certain texts, we rarely consider them to be necessary. Since masks limit ventilation and the workers tire more easily, using them can slow down the tasks of moving, storing, and preparing corpses. It should be noted that the mask does not filter or provide protection over a reasonable period of time. Generally, there is no danger of contamination through the respiratory tract since there is no respiratory function in dead bodies and they do not present a danger for those handling them. Gases and strong odors are the most disturbing aspect.

Concerns during autopsy include the suspicion or possibility that a victim is positive for HIV, tuberculosis, or any of the known infectious illnesses mentioned in Chapter 3. In mass fatality situations, however, the possibility is generally minimal in relation to the number of victims. Standard hygiene and epidemiologic protective measures should be used, since we begin with the assumption that an undiagnosed or untreated illness might exist.

There has been much speculation about what should be done during autopsy when there is suspicion of HIV, tuberculosis, or other infectious disease in victims. It is only necessary to cover the mouth and nose when electric saws are used to open the skull, since the resulting bone particles, blood, and other fluids can stay in the air and be inhaled, even at a distance, by people in the morgue or in closed rooms where the operation is being done. There is also a risk for inhalation in open places depending on the direction of the wind and the position of the subject during the procedure. An effective protective method is to apply a constant stream of water over the incision area while the cut is being made, thus preventing the bone particles from becoming airborne and being inhaled. The same procedure done with a manual saw will not result in the same amount of pulverization and spattering because of the slower speed of the saw.

For the reasons mentioned above, it is not necessary to take extreme measures or use face masks throughout the handling of human remains. It is sufficient to cover the mouth and nose when necessary. In cases of autopsy, it is recommended that:

- ◆ Only the personnel who perform or assist in the procedure should be in the autopsy room or work site;
- ◆ A stream of water should be used over an incision area while a cut is being made;
- ◆ The opening should be made with a manual rather than an electric saw;
- ◆ The skull should not be opened if it is not a determining factor in death;
- ◆ *Body fluids should be neutralized with special disinfectants such as hypochlorite.*

It should be pointed out, however, that in certain types of disasters the use of breathing filters or gas masks is not only advisable but essential. This is the case when toxic gases exist at the site of the event and there is a potential escape of poisonous fumes such as in fires that generate toxic smoke, among others.

In a case where there has been a toxic gas leak—for example, ammonia—corpse removal will take place once the situation is under control. It should be kept in mind that gas may be trapped in areas that remained closed after the initial evacuation. Rescue personnel can be poisoned by inhaling gas while searching for bodies in these areas. Both rescue personnel and people returning to their homes after having been evacuated should be warned about this potential hazard.

Surgical caps, while not essential, are recommended for work in autopsy rooms. They are not necessary during the removal of human remains. Depending on the circumstances it is advisable to wear hardhats or some sort of protection against falling objects or a blow to the head during the recovery of corpses at the disaster site. When working in the field where there are steep slopes, a rock or other object falling from

a high elevation can reach high speeds and cause a land or rockslide that could seriously injure people working at lower levels.

The medicolegal team, like those working in search and rescue, should use clothing and shoes that are appropriate to difficult and varied working conditions. Depending on the situation, they also should carry equipment such as flashlights (laser flashlights are very popular); belts or vests with reflective material or with battery-operated light bulbs; sound devices such as whistles or megaphones with integrated sirens; canteens or other portable water receptacles; rope; knives; canvas or leather gloves; hand-held radios; and directional devices such as compasses, or even GPS and distance meters, among other items, that facilitate difficult work. In some cases radiation detectors or other sensors may be necessary, and in very cold climates workers will need coats or blankets (even electric blankets) and other accessories depending on the working conditions.

Instruments and equipment

This section addresses in general terms the instruments, equipment, and different technical procedures that might be necessary for managing mass fatalities in disaster situations. Some have been mentioned in preceding sections on transportation, communications, and clothing.

Rescue teams, whether firefighters, military, or civil defense workers, should have certain basic equipment. This includes equipment for tracking, debris removal, cutting, compression or decompression, fire extinguishing, illumination, and other basic activities linked to the work of search and recovery.

The teams should also have stretchers that can fold and are as light as possible, since bodies are often recovered in uneven terrain where it is impossible to use wheeled gurneys. Gurneys can be placed at intermediate receiving points where the ground is level, and can even replace typical work tables.

In disaster situations where there are massive fatalities, it is not an ethical violation to place human bodies individually on the ground, in an organized and respectful manner. This should be done only when the usual sites for holding the bodies are exhausted. In such circumstances there are basic rules: for example, it is prohibited to pile bodies one on top of the other in any storage situation. However, it is permissible to place bodies on top of others when transferring them from one point to another in available vehicles, or in extreme situations when it is necessary to use refrigeration to preserve the bodies.

Autopsy is not systematically performed in disaster situations but is reserved for those cases in which important information can be obtained both for clarification about the event and for victim identification. In cases where victims are well-known or it is advisable for other reasons, this scientifically important investigation should be carried out not only for clarification of the event but to determine other aspects relating to their death.

As part of emergency preparedness it is necessary to consider the requirements for autopsy, including basic autopsy instruments. The ideal instruments for autopsy include: scalpels with handles, different types of forceps and clamps, rib cutters,

knives, skull chisels, probes, hammers, manual and electric saws, ladles, magnifying glasses, scales, and tags, among others. A tape measure, ruler, or anything for measuring the body length and specific measurements such as the feet, are essential for identification, as well as a straight measure for photographic and film documentation. Basic facilities include tables, running water, and lighting.

The best option is to conduct autopsy in a morgue and by qualified personnel, but the situation may arise when a physician will have to carry out a autopsy with what is at hand. Experience shows that with great creativity and skill, it is possible to accomplish exterior and interior studies of a body using no more than a common kitchen knife.

Materials needed to collect biological samples (for toxicological, histopathological, microbiological, or other laboratory studies) include plastic bags of different sizes and glass and plastic bottles, preferably with lids and of different volumes. In any case, they should be very clean. The containers must always be clearly identified and the contents should be adequately preserved either through refrigeration or, when necessary, using formaldehyde or a similar preservative. Alcohol or other preservative liquids can be used as long as they do not interfere with future tests.

As part of the investigation, documentation of the measures taken is important. The still or video cameras mentioned earlier, as well as tripods and lenses for special shots should be available for this purpose. These items should be taken into account during the emergency planning phase, or they should be acquired specifically for emergency situations.

Body preservation measures

Issues about preparation and final disposition of dead bodies will be discussed in detail later in this chapter. We touch on this topic here because preservation is required from the moment that human remains arrive at the place where examination, identification, and preparation for final disposition are done, particularly since these tasks are done in a staggered fashion.

The need for refrigerated holding areas should be anticipated, depending on the type and magnitude of event. Mobile or portable refrigeration units operated commercially (refrigerated containers or trucks) can be used. The morgue's refrigeration capacity surely will be exceeded during a disaster, especially if there are many unidentified bodies or remains recovered in the first hours of the event.

It is advisable to have refrigerated trucks that are used for routine commercial transport as close as possible to the body recovery site. They can be converted into temporary holding areas, keeping in mind the recommendations already made in the section on transport.

The use of other preservative measures such as quicklime (calcium hydroxide) and formol and zeolite will almost certainly be necessary, as well as commonly used disinfectants such as hypochlorite.

Temporary work camps or sites

The need for temporary work camps or sites depends on the type and magnitude of an event, the condition of human remains, the proximity to and accessibility of material and professional resources to deal with this type of event, as well as social circumstances at the disaster site.

Search and recovery of human remains and disaster relief activities in rural areas can last for days and sometimes even weeks or months. Temporary camps must be established for the personnel carrying out this work. These camps will also serve as an intermediate stop in the transfer of human remains. This should be taken into account in the disaster plan.

The examination and temporary holding of bodies and other medicolegal activities might have to be done under poor conditions, such as on boats or in sheds near the disaster site. In the case of earthquakes, for example, buildings existing for medicolegal examination and preparation of human remains might be damaged, or it may simply be impossible to access them.

In other cases, there are no medicolegal facilities in proximity to the disaster site or even in the closest community, or the capacity of existing facilities is insufficient to handle the workload. Temporary arrangements must then be made to work in other buildings or in tents or military huts. Access routes to these sites should be determined, and the ability to supply water and electricity should be ascertained. Again, these circumstances should be anticipated when developing emergency plans for each region.

When planning for temporary medicolegal facilities, at least three working areas should be designated:

- ◆ Holding area;
- ◆ Viewing area; and
- ◆ Examination area.

These areas will be different sizes and have different facilities depending on the type of disaster and the resources available at each site.

To facilitate identification of dead bodies, a provisional holding area, which is typically in an open space, should be set up to receive human remains following their removal from the disaster site. It is used while an initial description and classification are made, based on general features (race, sex, age, and stature) or other distinguishing features.

The holding area is used to receive dead bodies that are being transferred without undergoing examination because family members have been able to identify them, making it possible to release them according to certain legal provisions (we will return to this topic in the section on identification). Other reasons for placing bodies in the holding area are because family members are in the process of completing required legalities before they can take possession of the body; because the remains have not been identified; or because the body must be embalmed before being transported out of the country.

A private viewing area should be designated where family members and others will view photographs of the bodies, objects pertaining to the deceased, and finally, the bodies themselves. The procedures involved in visual recognition of the body are discussed in the section “Methods for identifying human remains” later in this chapter and in Chapter 5.

Examination space will be needed if it is necessary to conduct a more detailed exterior assessment of the body, provide a detailed description of the remains or fragments found, do an internal examination to confirm information received, take samples for laboratory studies, or make a complete autopsy.

The procedures outlined above justify the need to plan for the three working areas (holding, viewing, and examination), but it should be kept in mind that space for other activities also is needed. There should be spaces for documentation and provisional filing of information, for interviews with family members and others, for press conferences, and for briefings of experts, families, and claimants. Also needed are areas for cooking and eating, for sanitation services, for an infirmary (although minimal), and for other activities related to the management of dead bodies.

It is important to be aware of certain management principles regarding shelters and temporary settlements; these have been published in other scientific documents and have many features that are applicable to the temporary work sites. Among the most important are elements of hygiene and communicable diseases, control of access to these areas, provision of drinking water, and waste disposal. Other factors to consider include the placement of bodies, wind direction, and how the topography of the site will affect the flow of work.

Water and food

Water and food provision in major disaster situations is addressed in various publications about disaster management. This is vital to sustaining the mission, and the people responsible for organizing the emergency plan should give special attention to this issue.

Providing food and water to the victims and survivors of a disaster is a very complex undertaking, and it is no less complex to provide food and water to relief workers. Under no circumstances can we allow the improper handling of food and water to cause illnesses that will limit or delay the tasks of search, recovery, identification, and preparation of human remains.

All of the existing disaster management principles should be applied to handling food and water in emergencies, but some special conditions apply during medicolegal work, particularly relating to the consumption of water during work and the use of gloves. Generally gloves are worn, often surgical gloves, and in many cases they have to be reused after removing them, for instance after using the toilet. During long work days, water intake can be three to four times above normal. To save time, it should be possible to drink water during working hours without removing one's gloves by using disposable bottles and glasses or drinking fountains that can be foot-operated. If necessary, the task of providing water should be assigned to a specific person. In no case should there be open receptacles that can be easily contaminated.

Food should be distributed using comparable safety measures, avoiding items that can spoil easily and adapting the type of food to conditions at the work site and the climate. For example, when there is intense cold, the foods prepared should help to conserve body heat so that people can work for as long as possible. In severe conditions work shifts might have to be much shorter than usual, which affects calculations for the time needed to complete the work compared with normal conditions.

Medical care

Medical care is usually planned for victims, survivors, evacuees, and displaced persons in the context of a disaster. We must also take into account necessary medical treatment for the people responding to the disaster. This is not limited to treating injuries and other emergencies resulting from accidents, but for routine medical care that professionals and their assistants need. There is no doubt that relief workers will suffer from hypertension, diabetes, and other diseases that can easily change for the worse in emergency situations, particularly under the pressure of so much work and stress.

A good medicolegal disaster team should ascertain whether its staff will have any medical needs during the emergency and what medications they will need, and include these in an emergency kit. In addition, muscle relaxants, analgesics, and other medications for problems associated with muscle strain, as well as anti-diarrheal medications and digestives are frequently needed when many people are mobilized.

PARTICIPANTS

We have divided this section on participants into two groups depending on how they participate, their positions, and whether or not they have specialized knowledge or training in disaster management and the specific tasks they are expected to perform.

Disaster professionals

Health personnel

Ideally there should be sufficient medicolegal specialists available who have training in managing mass fatalities in disasters. In some emergency events it is possible to mobilize such a group of professionals in a timely manner, but this is the exception and not the rule.

We should at least aim to have a number of physicians, albeit limited, available to oversee the work. Preferably they will have received adequate theoretical training and some practical experience, and know how to integrate their actions with those of other participants such as fire fighters, rescue personnel from different backgrounds, police, criminologists, and others involved in disaster response.

Even in the worst conditions, a physician without training who uses his or her common sense and follows the basic principles presented here can perform with a certain degree of success. This is precisely our objective in writing this manual.

In the absence of forensic specialists, physicians, or dentists, the work of other professionals such as nurses, veterinarians, biologists, pharmacists, funeral administrators, and even gravediggers will be valuable. The latter, while usually having limited education, have sufficient psychological preparation to carry out the work when they receive adequate supervision. On more than one occasion we have seen professionals, including physicians, paralyzed by the magnitude of a disaster. They have been psychologically unable to assist in anticipated tasks, particularly in the recovery of bodies and body parts or in the most basic examinations needed to make identification.

Identification of remains might require involvement from forensic anthropologists or the use of regional laboratories to carry out genetic and toxicology screenings or simple photography and X-ray. The involvement of acting physicians in this work is especially desirable, but their absence should not be an excuse for delaying identification.

Outside assistance from both national and international sources should be requested when there is a very large number of dead bodies, and especially when they are of different nationalities as is often the case in aviation accidents. Forensic experts from different places can collaborate in tasks, or there should be at least one who is able to direct and organize the work. In accidents involving many nationalities, cooperation is needed to acquire the information needed to identify corpses; this is facilitated with the participation of experts from other countries.

It should be noted that search and rescue for survivors begin from the moment of impact of an event. The request for external assistance does not in any way preclude taking responsibility at the very beginning of the emergency. It is at this point that the physician who initially confronts the disaster should assert his or her knowledge and skill.

Police, firefighters, and other special forces

The police and firefighters generally have specialized training and organization in disaster response regardless of where they are from. To these we can add relief workers from the Red Cross and civil defense or comparable organizations as well as civil and military institutions that might include speleologists, special or assault forces, and diving teams, among others. For the best outcome there should be adequate planning and timely coordination with the expected participants in disaster response.

Experience shows that non-medical rescue workers sometimes give the same priority to the recovery of dead bodies as to the rescue of survivors. This may be because it can be difficult to make a timely diagnosis of death, but more likely it is because of a lack of training and inadequate preparation for this type of work. Resources and efforts are diverted unnecessarily to those who can wait—the deceased—to the detriment of the seriously injured survivors who cannot wait for assistance.

In most areas where professional fire services exist, they are fully aware of hazards and the potential for disasters in their own response areas. When health services in the same area are preparing their disaster plans, they should connect with the fire services and integrate their disaster response information into the health services plan. Where there are large industries such as oil and mining, among others, industrial safety specialists develop emergency response plans. Emergency medical actions can be derived from these plans and extended to the general community.

Criminologists and disaster specialists

Criminology is a science that has made important strides in recent years, especially in the application of new techniques to scientifically verify evidence used in investigations.

Some authors describe criminology as the branch of penal law that is concerned with scientific discovery of evidence of a crime and a criminal. For others it is the discipline that examines materials that can become proof of a crime committed by someone, and which is dedicated, among other things, to the study of the crime scene, of materials taken from the site, stains, projectiles, shoe and other prints, among other elements that give evidence of a crime.

There are many possible applications of criminology to disasters, ranging from documentation and study of the site of the event, investigation of vehicles linked to the disaster (especially aircraft and other kinds of transport implicated in major events), and the study of bodies, secretions, and other biological matter used for identification purposes.

Documentation of the site of the event, including in natural disasters, is of special interest since the study of a particular event will always be important. From the criminology perspective documentation should be done immediately and standard, digital, and video cameras are important for this task. In the absence of expert photographers, anyone with minimal knowledge of photography techniques can undertake this work. Even though the novice photographer will make mistakes, this is preferable to not having any photographs for later study.

With or without photographic media, drawings, sketches, and written descriptions of what is observed are the oldest and safest ways to keep a record of an event and in no circumstances should they be abandoned. The usefulness of even the most modern documentation methods will depend on the skills and availability of personnel who know how to operate the equipment.

Forensic genetics is one of the most important tools for the identification process. It uses classic blood groups of the ABO and Rh systems, immunological study of the human leukocyte antigens (HLA), and thanks to developments in molecular biology, DNA typing.

It should be noted that while these techniques are indicated in special cases, we recommend that biological matter be collected and preserved at the beginning of the investigation in case there is a need for it in the future. Identification is usually made by visual recognition of the victims or their belongings so laboratory tests are neces-

sary in only a limited number of cases. But without biological samples laboratory tests will not be possible.

When it is necessary to use additional techniques for identification, we should begin with the simplest and least costly, which are widely available. Contrary to what many lay persons believe, DNA is necessary in only a limited number of cases for identification.

The term “disaster expert” describes specialists from different disciplines who are dedicated to the study of disasters. There is no defined education in this branch of knowledge, which is a highly complex and broad field, encompassing a wide variety of disciplines such as engineering, medicine, dentistry, veterinary science, geography, seismology, meteorology, cybernetics, physics, and mathematics, among other sciences. In the case of forensics it is very important to use a comprehensive approach since a whole range of questions have to be dealt with in each situation, not only questions about identification.

Architects, engineers, and other professionals

It is not unusual today to see a wide range of professionals who are dedicated to studying and working in the topic of disasters. Among them are: architects, engineers (with specializations in civil, aeronautical, hydraulic, mechanical, geophysical, and electrical engineering), seismologists, nuclear physicists, geographers, and meteorologists, among others.

Their level of preparation and participation in the multi- and inter-disciplinary groups that cooperate to develop emergency plans for the zone or territory where they work can be vital for a better outcome in a disaster.

Journalists and media personnel

The role of the media in disaster situations is a very complex topic, especially because of the sensationalism that many of the world’s communications media use to portray these events. Education about disasters for media personnel, especially regarding the management of mass fatalities in disaster situations, is essential. The media play a major role in guiding and informing the public about search and rescue, and about identification and preparation of human remains for final disposition.

Because of their informative role and contact with the public, the communications media can be useful in obtaining the necessary data to identify bodies that have been recovered but remain in holding areas because of a lack of information.

Judicial authorities

Judicial authorities are responsible for making decisions in cases that merit legal review. They might participate early in an investigation when it is linked to a violent act caused by humans, in which case someone might be accused of wrongdoing, prompting legal action. This is most common in traffic and aviation accidents, and in these cases judicial authorization is required to carry out many procedures, including autopsy and other forensic investigations, laboratory tests, and the release of human

remains to family members. For these reasons, judicial authorities should have knowledge of disaster preparedness plans.

Other participants in disaster response

Government and community authorities

In general, government and community authorities have little knowledge of disaster preparedness but they play a critical role in disaster response. Because the people occupying government positions change periodically, it can be impossible to ensure that their training is current. Consultants or advisors who are experts in disaster management are valuable and can be retained from one political cycle to the next.

Government authorities arrange for and decide on basic actions that range from early mobilization of a large number of the public safety personnel involved in the event, to the decision to request outside assistance when local resources cannot manage the emergency.

Since other major decisions are in their hands, they need to be receptive to the judgments of the experts, who in turn have the obligation to explain their criteria. Advisors should explain the best course of action to adequately manage a high number of fatalities.

Religious institutions and other local interest groups

These play an important role in most countries and can be very helpful in the organization of the community. They can help to provide basic information for identification files and assist family members in the process of identifying corpses as well as in the delivery of corpses to the family.

Morticians, gravediggers, and others

While not classified as “disaster professionals,” morticians, gravediggers, and others might be among the most stable and well prepared to deal with emergencies with mass fatalities owing to their training and routine handling of dead bodies. However, they can also be negatively affected in these cases since they do not normally work with massive numbers of bodies.

Mortuary staff can offer very practical help, particularly because of their experience in dealing with family members and in preparing bodies for burial. In most countries mortuary services are responsible for complying with regulations for incineration and cremation, embalming, and making the necessary arrangements for transporting bodies, especially when the remains are repatriated. They should be included in disaster preparedness plans for these reasons, and their experiences should be heeded even though they usually relate to individual deaths.

Diplomats and consular representatives

Diplomats and consular representatives become involved whenever their nationals are caught up in a disaster. This is most frequently the case in aviation accidents or other types of transport accidents where international routes are involved.

Conditions should already be in place for attending to these authorities and co-ordinating activities with the corresponding ministry of foreign affairs. They can play an important role in finding information about presumed victims, especially by making rapid contact with family members and validating the information provided.

While this practice varies from country to country, frequently a consular office is present at the time the body of an identified victim is placed in a coffin and the coffin is closed, after which the body is transported to its country of origin. The presence of the consular officer provides official corroboration of the process.

Cooks and other service personnel

Cooks and other service personnel are very important in these emergencies since the work of search, recovery, and identification of victims can last for many days, with most of the time being spent at the site of the disaster. Water supplies and food are needed, as well as attention to other needs of mobilized relief workers. These services should be well organized whether provided by a contracted institution, catering service, or, if they have the capacity, by the agencies directly involved in disaster response.

Other needs should be kept in mind such as the availability of sanitation services, washing facilities, dining areas, a small infirmary, telephone booths for calls of family members and other staff at the site, as well as a taxi service for people who come to the disaster site and need transportation to areas where corpses are being held and released. This type of service is important in remote areas where taxis are not commonly available, particularly at night.

Family members, neighbors, and the general public

Family members, neighbors, and the general public are nearly always present from the beginning of an emergency, before the authorities arrive. They can assist or hinder in the early work of responding to a disaster. For this reason it is important that the public receive education in anticipation of an event and have good leadership once a disaster occurs.

All family members of the presumed victims must be given preferential treatment. It is especially important that they receive information regularly even though it comes from a centralized source and may not directly apply to their loved one. It should be understood that families are anxious and undergoing difficult times and as a result will not always behave rationally.

OPERATIONS COORDINATION

The work of assembling and directing a multidisciplinary team in disaster conditions, especially where there are mass fatalities, can be extremely complex regardless of the physical conditions at the site or the material resources available. Experience shows that this work will be effective when participants are well prepared and the coordinator of operations has the necessary knowledge, authority, and leadership skills. When these conditions exist it may be possible to avoid the dreaded and all too common “disaster on top of disaster” caused by disorganization, lack of coordination, despair, and improvisation. Having too many chiefs without a mandate and many workers without any guidance will have negative results.

The following sections summarize aspects of operations coordination in disasters with mass fatalities and is based on the accumulated experience of experts from different countries. Each case should be adapted to the existing conditions in each area and to the type of disaster being faced.

Search for information

Information is the basis for decision-making today more than ever, and it is essential in disaster situations. Simply knowing about the event that we are facing, the probable number of fatalities and condition of human remains, or prevailing weather conditions, to name only a few variables, will significantly affect how we respond.

The place, the event, and the hazards

Once advised of a disaster, we need some basic information to allow us to better implement the emergency plan. It is presumed that the plan was prepared during normal conditions and considers variables according to the place, the type and magnitude of the event, conditions for operations, available resources, and other aspects particular to a specific type of event.

Soon after the impact of the event, the physician or other professional who is summoned to coordinate the management of massive fatalities should determine or estimate as precisely as possible the following:

- ◆ The type of event;
- ◆ When and where it occurred;
- ◆ Actual or potential number of victims, including the number of fatalities;
- ◆ Location of rescued victims, including dead bodies;
- ◆ Accessibility of the disaster site, survivors, and holding area for dead bodies;
- ◆ Estimated time to recover dead bodies;
- ◆ The condition of the bodies, their presumed identity, and the presence of foreigners;
- ◆ Potential hazards existing at the disaster site;

- ◆ Current weather conditions and forecasts; and
- ◆ Availability of resources to respond to emergency.

Presumed victims

When notification of the disaster occurs, there may be no idea of the actual number of victims, including the number of dead, or their identity. On the contrary, there may be information about an estimated number of victims and their presumed identity (for example, crew and passengers of an aviation accident). These circumstances affect the approach to removal and identification of dead bodies.

Once there is a general idea of the identity of presumed fatalities, an immediate search should begin for the information needed to create identification files corresponding to each case. Directing this process is one of the most important tasks for the coordinator at this stage.

- ◆ Among the most common sources for basic information are interviews with people who have close ties to the victim, including:
 - Relatives, friends, neighbors, classmates, teammates, and work colleagues;
 - Physicians and dentists;
 - Personal nurses, physiotherapists, or podiatrists;
 - Tailors, seamstresses, or clothing retailers;
 - Photographers, jewelers, hairdressers, and masseurs linked to the victim; and
 - Survivors and witnesses of the event.
- ◆ The search, receipt, and review of the following kinds of documents also yield essential information:
 - Personal identity documents;
 - Registration papers, especially those with fingerprints;
 - Photographs and videos of the subjects and their belongings;
 - Medical and laboratory records and x-rays;
 - Dental records, including x-rays and dental charts;
 - Receipts for the purchase of clothing, watches, jewelry, etc.
- ◆ Articles that can be used for comparison include:
 - Clothing and shoes examined for size, wear, and odor;
 - Personal combs with hair from the subject or hair from another source;
 - Objects touched by the subject moments before the event;
 - Preexisting stains from the subject found on a variety of objects;
 - Samples from immediate family members to be used for forensic genetic studies; and
 - Dental impressions or prostheses.

Keeping in mind that identification is based on the comparison of information obtained from human remains (post-mortem data) with information about the presumed disaster victims (ante-mortem data), it is essential to set up an identification file with data for each of the persons presumed to have been involved in the event. This allows us to classify the victims for more rapid medicolegal processing. It is better still if the information can be processed with computers and software created especially for these situations.

Gathering information about presumed victims is a very important phase in the investigation. With the exception of people such as aviation personnel or others in high-risk occupations who have intentionally provided information in advance because of the possibility of an accident, an identification or data file is generally created after a disaster. This comes at a very difficult time for the people who should be able to provide basic information since they are usually the closest to the presumed victims. They might initially refuse to cooperate because they do not want to face the reality of their loved one's death, or they might provide incorrect data because of their state of mind at the time of the interview.

Whenever possible the interview with family members or associates should take place in a suitable setting using all possible resources to gain the cooperation of the subject, including the support of psychiatrists and psychologists when deemed necessary. It is important to evaluate how confident the interviewee is about the information he or she is giving. Particularly when working with a closed group of victims (i.e., the number of victims and their presumed identities are known, as, for example, in an aviation accident), one mistaken piece of information can be enough to lead to multiply errors in the identification process.

When various informants are interviewed about the same person, there will be differences in the information they give. It is advisable to establish ranges for the supplied data that will finally be used. Generally maximums and minimums are taken, for example, a height of 165 cm to 170 cm, or an age between 22 and 24 years. In some cases unreliable data will be provisionally removed from the final file, or the questionable data will be included with an explanatory note. A common mistake occurs when interviewees try to describe something on the body of the presumed victim and they confuse the right and left sides. This is due to our perception of the opposite side of the person or object we face in relation to our own body. It is not unusual for the interviewee to say that someone is missing the upper right canine when in fact the left one is missing, or that someone broke their left forearm as a child when it was actually the right one.

It is advisable to choose from among the many data collection forms that have been developed by experts from all over the world. The forms should be adapted to reflect the characteristics and vernacular of the region where the disaster occurred and which are presumably shared by the person conducting interviews. It is important to keep in mind that a word can have very different meanings in different regions or will not have any meaning for the interviewer. For example, the words "lame," "halt," and "crippled" are synonyms but might not be descriptive to someone who is not familiar with the terms.

Part of the information for identification will come from a search for basic personal data (*ante-mortem* data). This information, which may vary depending on circumstances and the person interviewed, would generally include the following::

- ◆ Clothing that the victim wore, including type, color, sizes, characteristics, brands, and other details;
- ◆ Jewelry worn, including type, amount, shape and color, sizes, characteristics, markings or inscriptions, and other details;
- ◆ Documents carried, including type, number, and location, among other details;
- ◆ Documents that the victim did not carry, including photographs that can be used for comparison, and hand- or fingerprints of the subject;
- ◆ Medical files and other documents with clinical information;
- ◆ Characteristics of the presumed victim, including age, gender, race, and stature; scars, blemishes, birthmarks, or tattoos; hair color (natural and dyed) and characteristics; presence of moustache or beard, and their characteristics; dental prostheses, dental chart, and other dental studies; blood type and other genetic information; x-rays and other relevant laboratory tests; data about any *ante-mortem* trauma, abnormalities, and orthopedic and other prostheses; known illnesses; surgery experienced and special consequences, if any; and any other particular information for each case.

Collecting the information outlined above is the basis for comparing corresponding characteristics from the examination of human remains, thereby establishing an identity for the dead person.

This information can be saved on computers using software developed for this kind of work, or databases can be created for a specific event. Lacking this technology, it is still necessary to organize the information so that it can be processed easily, expediting the comparison of data from the examination of recovered bodies with data provided in interviews with relatives. There are various methods for processing these data and the experts should be aware of the most appropriate considering the available resources.

REMOVAL OF DEAD BODIES

From the moment a disaster occurs, there begins one of the most complex and generally least professionally performed processes in disaster response, which is the recovery of dead bodies. This nearly always becomes a confused and disorganized removal of human remains from the disaster site by many different people and only rarely by the acting physicians in disaster operations.

The removal of human remains from a disaster scene is one of the most important aspects in the investigation of a presumably criminal act from the medicolegal, criminological, and finally judicial perspectives. In most disasters suspicion of a criminal

act is not adequately considered at the outset of the response, which can hinder the investigation in many cases. Unfortunately, in events where criminal motive is likely, as in aviation disasters connected to terrorist activity, the investigation aspect is neglected. This occurs because of lack of knowledge about investigation methods, shortage of personnel who can complete the work efficiently in the short term, and the intense social pressure to remove bodies from a disaster site.

It is very difficult to use scientific investigation principles at the disaster site, especially because of the psychological and political pressure that surrounds such events. It becomes a “priority objective,” although without any scientific basis, to rapidly remove the human remains from the site. This hurried response poses the risk of destroying evidence that could explain the event or even facilitate faster identification of victims, particularly in cases where there are body fragments.

Notwithstanding the pessimistic assessments made above, which are based on a reality experienced over many years, the doctor or professional responsible for the difficult task of coordinating and carrying out the removal of corpses should understand the methodology, and above all have the staff and support necessary to perform effectively. Even when corpse removal cannot be carried out correctly, using established scientific methods, the physician or professional in charge should try to save as much evidence as possible, and above all document the scene with still photography and video, even though the photography equipment is not professional. Photographic evidence of the scene can be important later for the experts who attempt to resolve unanticipated medicolegal problems associated with the disaster.

Procedures at the disaster site

Once notification of the disaster is made, specialists and their assistants are transferred with the transportation available to the disaster site where, according to the type and magnitude of the event, they might be carrying out such parallel actions as search and rescue of the survivors (injured or not), removing rubble in different areas by hand or with machines, extinguishing fires, and controlling toxic gas leaks, among other activities.

As can be seen from this simplistic description, in most cases the disaster site is the focus of intense activity. A great many people are present and unfortunately many of them do not have a definite plan of action. They may have entered the site despite security measures and restrictions on access. Their assistance is spontaneous and arbitrary, and many times they take on a leadership role for which they have neither the skills nor necessary experience. These difficult conditions are the backdrop for the important work of coordinating the survey and removal of corpses that has been assigned to the acting physician.

There may appear to be many supervisors, and on more than one occasion it has been almost impossible to determine who is in charge. It is important to define who the law establishes as having maximum authority, and in collaboration with other agencies, follow the procedures as they have been designed for the case in question. Waiting until it is decided who has the legal authority to supervise can create major problems.

Without using a specific example it is difficult to explain where and how to begin the process of survey and removal of corpses. Certain principles should be kept in mind when making decisions about the most appropriate strategy to use. For example, we should be aware of the total possible dispersal area of human remains, the immediate accessibility of all the affected areas or exposed bodies, and whether other resources are needed to reach them. It is also essential to know the number and condition of remains, effects from fire and other agents, among other features.

The site should be divided into work zones in order to organize the process. Preferably the area should be defined by existing fixed objects, using a sketch with each activity consecutively numbered. This allows an efficient and simple reconstruction of the approximate location of each body or fragment after it is removed from the site.

The cardinal points must be located as reference points, and a calculation made of the approximate total surface area of the disaster site, especially the area where bodies and body parts are dispersed. This area is recorded on a map or basic sketch. It is useful to place flags or stakes, paint signs, or use other markings or reference points when there are no fixed objects to give adequate orientation. If conditions permit it is helpful to make a rapid topographic survey of the site and fix features related to the event to assist in defining the work zones.

When certain conditions are present, the location of groupings of human remains will be described. These conditions include:

- ◆ The number of dead is high and there are more than five dead or presumed dead for each specialist (a specialist in forensic medicine with training in disaster management). The standard tasks required will be body removal and possibly complex identification activities beyond simple visual recognition;
- ◆ The disaster site is very large, i.e., more than 5,000 m² per specialist;
- ◆ The human remains are widely scattered, covering an area greater than 1 km²;
- ◆ The bodies are in areas that are difficult to access and they cannot be reached quickly via ground transportation.

Under these or other special conditions, descriptions made in the survey should signal only the most significant elements that are of medicolegal interest. These would include: the position of the body; the location of exterior wounds and their relationship to objects at the site that may have caused the injuries; proximity to a secondary fire source, or on the contrary, burns without evidence of fire in the immediate vicinity of the body. In the case of traffic and aviation accidents, specify whether the bodies are inside or outside of the vehicle and whether safety belts are fastened, and note evidence of objects in the vicinity of the body that might have caused injuries, and other aspects of general medicolegal interest.

One topic of debate has to do with numbering the corpses that are being recovered, especially when there are several acting physicians. This need not be a controversial issue: whatever the method or coding used, it should be able to reproduce or approximate, even in just a sketch, the location of each body, establishing the relationship between the bodies and objects around them, and at the very least, indicate from which zone of the disaster site the body was removed.

A simple method is to assign a letter to each acting physician (A, B, C, etc.) or a letter that relates to his or her name (P for Peter, R for Ray, M for Mary, etc.), noting the zone he or she is assigned to work. After these zones are assigned to each physician, begin coding remains with number 1 and number them consecutively until the assigned work area is completed. When the human remains arrive at the holding area or temporary morgue they will be identified with consecutive coding (for example, A-1, A-2, A-3 or P-1, P-2, etc.). A sketch of the area showing where each recovery was made serves as a record of the process.

There are specialists who can carry out aerial topographic surveys prior to the removal of the corpses using still photographs or video. This sort of survey is possible when weather and conditions at the site allow it, and assuming resources are available. However, this type of survey does not exclude or substitute the individual or group survey described above. It is essential for physicians to receive basic training in performing the survey since it is one of the first things that he or she will do in a disaster situation. Because of its urgency it nearly always will have to be performed before specialists arrive at the scene.

The physician's basic survey report should include the following:

- ◆ Code number of the document;
- ◆ Name and code of the acting physician;
- ◆ Exact hour, date, and place of the activity;
- ◆ The authority requesting the action;
- ◆ Integrity of the bodies (complete body, body fragment, commingled remains, tissue mass, etc.);
- ◆ Estimated age, sex, race, and skin color, if recognizable;
- ◆ General description of clothing (the most significant or identifiable features);
- ◆ Documents accompanying the body and names appearing on them;
- ◆ Jewelry on the body;
- ◆ Position, injuries and elements related to the date of death, among others;
- ◆ Correlation between injury and site of the event and other information about the scene; and
- ◆ Signature of the acting physician.

When it is possible to surmise the identification of a victim because of documents found during recovery, including corresponding photographs, it is advisable to put a final note in the document stating, "Presumed identification is...." The code assigned for the recovery should be circled or marked in some way to indicate that a preliminary identification has been made. This will assist in classifying bodies as they arrive at the holding area or temporary morgue.

One concern is how to register the code used during the removal when the integrity of the body is compromised and there is only a fragment or tissue, the body is decomposed because of the time since the event, or the body is charred. In such cases it is advisable to remove the remains using body bags; if body bags are not available use something similar that is strong, or use doubled or tripled garbage bags. Write the

code assigned to the case with a contrasting color of indelible ink on the outside of the bags, which are usually white, black, or green. The code also should appear on two small, metal identification (ID) tags that have been stamped or at least written on with indelible ink. One ID tag is tied with wire or strong cord (preferably a synthetic material) to a secure part of the body or fragment, while the other is attached to the closure of the bag or somewhere visible if the bag has a zipper or clasp.

When a body is recovered within a few hours of death, some authors recommend placing a third ID tag inside the mouth since rigor mortis will cause the mouth to remain tightly shut and under no circumstances will the tag be lost. The disadvantage is that to extract the tag to check coding, incisions have to be made to release the rigidity of the mandible. For this reason some experts recommend attaching tags to the exterior of the body.

The plastic bracelets used in hospitals for patients and in hotels as guest identification are a good option for tagging corpses. They are strong, of good quality, and each can be pre-printed with its own code. One limitation is that they are difficult to attach to bodies that have missing limbs. Another consideration is that the coding on the bracelets will not be randomly assigned. Unlike the more traditional type of tagging described above, if one does not complete the work oneself, the bracelet will not have the information giving the number and order of removal or the physician who did complete the work. An additional control system would have to be established to include this type of information. For these reasons bracelets are more appropriate for use in reception and holding areas where there are facilities to work with the human remains rather than during the complex recovery phase.

As is obvious from the above discussion, the physician will need several assistants for the survey and removal of corpses. They should have stretchers to move the human remains as well as enough bags and coded identification tags (stamped or painted tags, plastic bracelets, or other measures mentioned). The removal of the remains must always be done in the presence of and under the direction of the acting physician.

No examination of the bodies should be done at the disaster site with the exception of checking pockets of victims' clothing to look for identification documents. Any information about documents should be immediately annotated in the survey and corpse record. After describing documents found when checking the bodies at the scene, they should be identified with the same code used for the corresponding corpse, and placed in clear plastic bags so that they can be read without having to open the bag. Other experts recommend that documents be returned to the place they were found (for example, a pocket), and only removed during the final exam of a corpse at the temporary morgue or holding area. In either case, a photographic or video record made of the documents should be registered using still photography or video at the disaster site.

Documents might be found during the surveys that are not directly linked to any of the bodies. They should be recovered, put in a bag, and placed where they were found at the site. Note should be made of the closest body or bodies to the documents, and they should be given a predetermined code that is used only for document identification.

Jewelry found on the bodies should not be removed. Articles should be described and left in position until the detailed exam and description are done at the holding area. Photographs and videos will help the people who recognize the jewelry to identify the corpse. Even with photographic documentation, a detailed description of the jewelry should be made.

Transfer of human remains

Once the survey work is complete and the human remains are removed, they should be gathered at a holding area close to the disaster site where they will be examined or transferred to the site where final examination and disposition will take place. The location of the holding site will depend on many factors, including: the number of dead that have been recovered, the condition of the corpses, the distance from the disaster site to the closest morgue or autopsy facility (whether at a hospital or medicolegal institute), and the refrigeration capacity of these facilities, among other factors.

The human remains should be well packed in bags with corresponding identification, transported in trucks or vans (preferably closed vehicles), and refrigerated, if possible. The recommended temperature for preservation is 4 °C. We should warn against freezing the bodies since that will make immediate tasks such as detailed description for identification purposes more difficult. Freezing will also interfere with autopsy, although autopsy would normally only be carried out in special cases.

As mentioned earlier, the human remains should not be transported individually in ambulances or health service vehicles. If there is a shortage of health service vehicles in normal times, it is much worse during a disaster situation. In any case, even though the bodies are in well sealed bags, it is advisable to cover the floor of the vehicle to avoid possible contamination with liquids that might leak from the bag, especially when dealing with body fragments or tissues or when bodies are decomposed. As explained in the section on transport, it is important to cover any identifying markings on vehicles used to transport or hold corpses.

Holding and examination site

Once corpses are recovered and transported to the holding site, other studies will be undertaken, the most important of which is identification (we address identification methods later in the chapter). We should note that the demands on experts in each case may vary, and it is necessary to plan for the working conditions and space required for different tasks.

Regardless of the type of disaster, certain minimal conditions must be in place to carry out the examination and temporary deposit of the bodies. Some of these requirements have already been discussed in the “Material needs” sections of this chapter, but others may arise depending on the circumstances.

As mentioned earlier, control of access and availability of water and lighting are some of the basic requirements that should be taken into account for temporary working areas in disaster situations outside of a mortuary or medicolegal institution. At

least three working areas will be needed: the holding area, viewing area, and examination area. The size and characteristics of each depends on the nature of the event and the resources at the site.

Holding area

The human remains will be placed in a holding area as they arrive from the recovery site. The holding site must bring together certain basic conditions ranging from privacy, which is essential, to a place out of the sun where corpses can be placed, thereby slowing decomposition. In tropical countries or where temperatures are high it is advisable that this area be refrigerated to try to avoid decomposition, which is likely especially as a result of the injuries sustained.

The bodies should be arranged on their arrival to facilitate identification by classification. They should be placed in predetermined spaces, and classified by groups according to sex, skin color, and age. Other classifications can be added such as biotype and color and length of hair, and later, elements that require measurement, such as height and foot size, among others, can be added.

One aspect of identification can be accomplished at the same time that a corpse is transferred to the holding area. For example, if there are 150 presumed victims of the disaster and someone is looking for an elderly black man, who is tall and thin, there might be only two or three corpses matching that description. By placing corpses in defined classification areas, the task of determining which victim is being sought is considerably simpler. For the person seeking the elderly man, there are now not 150 victims, but the two or three who meet certain criteria, have already been placed in a defined holding area, and can be found quickly.

This holds for any case. For example, if someone is seeking a young woman who is white, short, heavyset, blond, and described as being pregnant, it may be that only one of the 150 victims have those characteristics. If victim transfer is well organized, it will be possible to immediately identify her body when it arrives at the holding area.

There are various computer programs that can assist in managing the massive amounts of information involved in identification and disposition of human remains in disaster situations. However, in the absence of computers we can use a classic method using cards (known as “McBee” or “keysort” cards) with holes around the edges, each of which is assigned one of the identification criteria. By inserting a wire or long needle through one of the holes it is possible to manage information for hundreds of cases rapidly and efficiently.

For example, assume we assign “male” to hole No. 1, “female” to hole No. 2, and “undetermined sex” to hole No. 3. When entering information about a male victim on a card, hole No. 1 is notched to the edge of the card. In order to select cards for male

victims, a wire or long needle is inserted through hole No. 1 of all the cards. Cards are lifted simultaneously and those with notches at hole No. 1 will drop out of the stack of cards. From hundreds of cards it will be possible to know in seconds which correspond to males. This operation is repeated for each criterion and each time there will be fewer cards with which to work for the case in question. The universe of victims is reduced as more identity parameters are available. We will return to this selection approach when we discuss identification.

Viewing area

Visual recognition may be necessary for identifying a corpse. This identification process is codified in many countries and is an important element of routine medicolegal work, not only in disaster situations.

It is important to have a viewing area for family members, friends, or others who can help in the identification. First, photographs of jewelry, clothing, or identifiable objects or features found in the examination of the human remains will be shown. During the second phase family members and others will view photographs of the bodies and especially of the face if there are features that can help with identification. In the third phase, objects and, finally, the remains themselves are shown directly to family members or associates to conclude the visual recognition phase and obtain the desired identification.

Of course this task should be done with great care, gradually, and taking required ethical considerations into account. The relative or person collaborating in the identification should be psychologically prepared. As in all medicolegal endeavors, the results must be skillfully interpreted.

We insist on this last point, since it is not enough that the persons to whom we show the photographs of jewelry or clothing or even the body or fragment say that an item belongs to a person or positively identifies a body or fragment. An interview should aim to determine the reasoning behind their responses, and should verify their knowledge about what they are saying. Their responses should be observed very closely even when they are directly identifying the body or fragments since nervous tension or simple rejection of the death of a relative or close friend can lead to mistaken or unrealistic responses.

Examination area

Since it is always necessary to examine the exterior of the human remains, including clothing, an examination area is needed.

Autopsy is not necessary for all victims of a disaster, although it is advisable in some cases and essential in others. A station for conducting autopsy is needed in the examination area.

In addition to an autopsy station, there should be work areas for other examinations made selectively on the corpses. Some examples are: evidence of whether an appendectomy has ever been performed, an examination of the mouth to review dentition, extraction of the humerus for measurement, or calculation of a subject's age

by examining the trabeculae of bone in the skull. It might be necessary to take biological samples for toxicology screenings, especially for alcohol, which often are obtained by needle puncture. Other samples might require opening of cavities, including evisceration.

Embalming or other techniques to preserve the remains can be done in the examination area. This area can also be used for sealing coffins in the presence of the appropriate authority. It is essential to have a work area that meets the minimal requirements for a temporary or field morgue to carry out these procedures.

METHODS FOR IDENTIFYING HUMAN REMAINS

There is great variety in the situations presented by disasters, and the conditions and possibilities for identifying disaster victims are also unpredictable. These range from considering the integrity and preservation of the corpses, to determining whether the victims are local or are predominantly foreign. Other concerns are the availability of disaster experts, particularly those with forensic expertise in identification, as well as the feasibility of finding the information needed to establish the presumed identity of a victim.

In the next sections, we present general methodology for establishing identity of disaster victims, beginning with the most elemental methods and advancing to sophisticated resources to resolve a particular case.

Identification using visual recognition

Once the remains have been recovered, examination of the exterior of the body and clothing will take place. Even though a presumed identity was made during the recovery, it must be certified after conducting an exhaustive exam.

Following the external examination, we proceed to classifying bodies, usually by sex, age, skin color, and if necessary, and depending on the integrity of the body, approximate height. Color and length of hair might be important for classification as well as features such as scars, prostheses, birth marks, and information about clothing and jewelry, among other items.

As discussed earlier, remains can be placed in groups or subgroups according to individual identification criteria in a level area or courtyard that is divided into sections, or inside a refrigerated container or vehicle.

To give an example, in each sex grouping there are several subgroups. The males can be divided into four age groups: children, youths, adults, and elderly (the range of ages should be specified for each subgroup). Each age group can be divided by skin color (for example, black, mestizo, and white), without using anthropological precision regarding race. These subgroups can then be classified according to hair color (black, brown, or blond). This continues successively with each characteristic that we use as an individualizing trait.

For example, in an aviation disaster with more than 150 deaths it is possible to make a rapid search for one individual according to the above classification system. With a

minimum of three traits, i.e., age, sex, and skin color, it is usually possible to match only 4 or 5 of the 150 victims. This can then be refined to other characteristics, some as simple as hair length. It might not be possible to classify all victims using this system because of the condition of the remains and lack of identifiable features.

Once the majority of bodies are arranged using this simple method, and after the remains have been examined and prepared by the forensics expert, they are presented to relatives, friends, associates, or others who can help with identification. This constitutes the so-called “visual recognition” process, which clearly requires prior organization. A written record of the elements that contribute to the presumed identification will be included in the file.

The identification process follows certain basic principles that can be summarized as follows:

- ◆ Converse with and prepare the observer psychologically in order to assess his or her actual knowledge of the presumed victim;
- ◆ Conduct the identification individually, not with groups of people or in the presence of other corpses;
- ◆ Use a place that has adequate lighting and privacy;
- ◆ Position the corpse carefully, ensure that it is clean, and cover any affected areas that would make a strong, negative impression on the observer;
- ◆ Do not remove clothing, jewelry, or objects that might influence direct observation, particularly eyeglasses;
- ◆ Show the observer areas of the body that might confirm information given during the interview, such as scars, tattoos, birthmarks, and blemishes, or dentures and prostheses if applicable;
- ◆ Verify each piece of information that the observer provides, even regarding features that are not visible, such as possible surgical procedures; and
- ◆ Prepare a written record and, if possible, film the process, explaining elements provided by the observer and any possible contradictions.

Once visual recognition is complete, which sometimes involves successive viewings by several individuals, verify whether or not the information provided coincides with what was obtained in the examination. Some of these elements would include: calculation of age, presence of specific dental work, verification of foot defect that affects footwear, or confirmation of an appendectomy, among other elements.

It has been scientifically demonstrated that in the vast majority of cases identification can be made using this technique, except when decomposition, burns (in particular, charring), or the severity of injuries (only fragments of the body remain) prevent these valuable judgments.

Identification using anthropological studies

Visual recognition is used to identify the great majority of those killed as the result of a disaster, as well as survivors who, because of their condition, can not provide information. A small number of corpses need more thorough study either

because of the extent of damage, especially to the face, or because there are not enough distinguishing features to establish certain identity. In these cases anthropological examination is an option.

In the case of victims who have been dead for a long time, it is very likely that technical verification will have to be done since simple visual recognition rarely solves the problem. We are referring to decomposed and even skeletal remains. This is very rare in disaster situations, but could occur in the case of accidents where aircraft disappear in jungle areas or in areas that are so difficult to reach that by the time victims are located decomposition or skeletonization has set in. The same may apply in mudslides and landslides when recovery of bodies is delayed.

In general, we speak of identity of the living and identity of a corpse. The latter is subdivided according to whether the death is recent or not, which is the same as saying that the body is or is not in a state of decomposition, the final phase being skeletal remains.

While it is unlikely that one will deal with skeletal remains in disaster situations, this does not rule out the use of anthropological methods. This discipline is dedicated not only to the study of bones, but also to studies of living subjects, and in a similar way the recently deceased (using somatoscopy and somatometry).

Absolute identity always should be established, and while we can only verify certain aspects of identity (i.e., age, sex, race, and stature), these aspects are sufficient to make a preliminary identification of the presumed victim. We then look for other elements that allow us to establish identity with greater certainty.

A general outline of activities, which is almost the same for the living as for the recently deceased, includes:

- ◆ Interviews with people who can provide information;
- ◆ Somatoscopic studies (including biotype, scars, tatoos, and other markings);
- ◆ Development and characteristics of hair (including length, color, and style);
- ◆ Genital appearance and development (description of external genitalia);
- ◆ Dental development and information (dental chart and dental anthropology);
- ◆ Bone development and information (evidence ranging from ossification to fracture);
- ◆ Somatometric studies (from foot size to height); and
- ◆ Possible diagnostic imaging comparison.

When the examination is of skeletal remains, it is advisable to proceed with the following tasks:

- ◆ Set up a preliminary file for comparison of elements;
- ◆ Prepare biological material for study, especially bones;
- ◆ Make observations of the bone;
- ◆ Locate ante-, peri-, and post-mortem injuries that will assist in identification;
- ◆ Look for bone disease and suspected bone anomalies;

- ◆ Take necessary measurements of the bone and make comparisons;
- ◆ Conduct diagnostic imaging studies of the body and cranium;
- ◆ Do odontological and stomatological studies, including dental anthropology;
- ◆ Superimpose skull and ante-mortem photographs, if warranted;
- ◆ Assess sculptural reconstruction, if appropriate;
- ◆ Conduct other tests as required.

These examinations support or exclude identity and in many cases a single test can rule out positive identification. In general, several tests are made and when all coincide we can establish the identity unconditionally. Results should be recorded in the report, which then can be complemented by other contributions. The interpretation of some tests can be misleading. For example, superimposition of skull and ante-mortem photographs can only exclude remains; simple coincidence in this test does not confirm the identity of the subject.

The osteologic study begins by determining whether bones are indeed human, which bones are present, whether they are from the right or left side of the body, and how many skeletons there are when remains are commingled. In direct observation of the bone we can describe the appearance and fusion of the epiphyses, whether cranial sutures are closed, the condition of bone trabeculae and the spinal canal, the presence of malformations and bone disease, racial and sex characteristics that can be determined from the skull and pelvis, and the presence of recent or old injuries to the bone that have caused typical deformity.

Other methods of identification

Any of the following studies can also be performed:

- ◆ Cytology,
- ◆ Fingerprint comparison,
- ◆ Forensic genetics,
- ◆ Molecular biology, in particular, DNA,
- ◆ Writing analysis, and others.

DNA IDENTIFICATION*

Historic background

Identification using molecular tools began with systems to determine relationship or parentage based on Mendelian inheritance using blood types. Information derived from blood types has a very low rate of accuracy owing to the limited number of

* This section on DNA identification was prepared by Beatriz Lizárraga, Raúl Tito, Paul W. López, and Gian Carlo Iannaccone from the Molecular Biology and Genetics Laboratory, Legal Medicine Institute of the Public Ministry of Peru, and Project for the Study of Polymorphism of DNA Markers in Peruvian Populations, of the Biochemistry and Nutrition Research Center, National University of San Marcos, Peru.

marker combinations. Following this they developed markers from human leucocyte antigens (HLA), a complicated system used primarily to verify the compatibility of tissues for transplant, a process that is rarely available for use in forensic laboratories. However, neither blood typing nor HLA typing can provide the variability that is needed to individualize subjects and, as a result, are not used for identification.

Regions known as microsatellites are found in the chromosomes of any species; their very high level of variability in populations favors their use as molecular markers. The variability found in these regions derives from differences in the genetic material in the same nucleotide sequence, through substitutions of nucleotides, or in the distinct lengths generated by the same sequence that is repeated over and over again. This was demonstrated for the first time by Wyman and White in 1980.

Despite the evident usefulness of microsatellites in tracking inheritance, and, therefore, for determining identification, reasons of a strictly technical nature restricted their application. In the mid-1980s developments began for identifying individuals based on the study of DNA polymorphism, which reflects the wide variation of sequences located in different regions of the genome. Researchers were able to develop specific systems for each species, including the human species.

Beginning in 1990, analysis using the polymerase chain reaction (PCR) technique gained currency in forensic laboratories owing to the relative simplicity of the technique, lower cost, and simple interpretation of the results, but above all because it requires minute quantities of DNA. DNA identification has gained scientific acceptance for forensic investigation and its power of discrimination has been validated, especially in cases that exclude biological relationship. Among the DNA identification systems, the analysis of nuclear genetic material is very informative owing to Mendelian inheritance, that is, half of the offspring's genetic content is inherited from the mother, and half from the father.

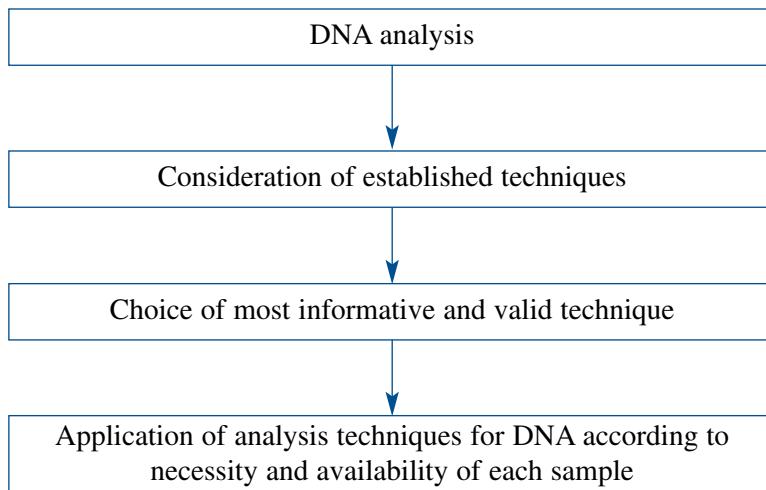
Difficulties with the PCR identification system have to do with the susceptibility of the DNA molecule to chemical modification by substances such as formalin; to structural loss by reactions with sodium hypochlorite; and finally, if it has not been digested by natural enzymatic processes, with time it begins to fragment through loss of regions that have a high content of adenine and guanine. However, if the samples used for obtaining the polymorphic profiles of each individual are recent or have been correctly preserved, the Combined DNA Index System (CODIS) will give results. If the samples or tissues to be used for obtaining DNA for analysis are stored at room temperature, the DNA will continue to fragment and it will not be possible to establish genetic profiles.

In some samples, such as small blood or semen stains, saliva, hairs, old corpses, or remains from massive disasters, DNA techniques provide the only chance of obtaining a genetic profile.

On the other hand, there is also a heredity pattern of a special type of DNA present in the cellular organelles known as mitochondria. The information contained in the mitochondrial sequence is inherited exclusively through the maternal line, so the link between people related maternally can be established and allows differentiation of individuals of distinct lineages. This feature, added to the fact that each cell contains a large number of mitochondria, that the mitochondrial DNA is less susceptible

to the chemical and physical modifications mentioned earlier, and it presents a region with a high mutation index (hypervariable region), makes this system very useful, especially in cases of highly degraded material. For the maternal relationships in humans the human mitochondrial genome sequence is used.

DNA identification process

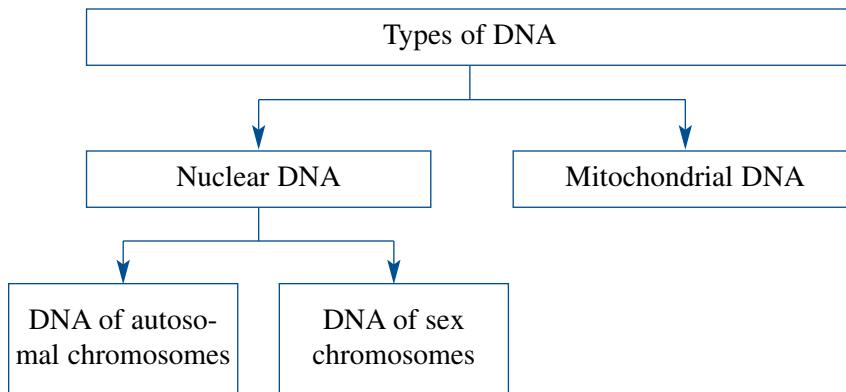


Currently in human identification cases both traditional anthropological methods and molecular methods are used, thus increasing the number of positive identifications. For example, in the Mesa Redonda fire disaster (discussed in Chapter 7), we were faced with making identifications in very complex cases resulting from a mass fatality event, so there was a need for DNA analysis in this instance. We should point out that the percentage error when using classical methods is 15 percent.

It is for this reason that methodologies for human DNA analysis have been chosen to be used as an identification tool. These techniques have demonstrated high reliability when typing the remains corresponding to unidentified individuals in disasters with massive fatalities worldwide. This clearly depends on the type of sample, the degree of sample preservation, and the period of time that the sample has been exposed to outside agents (for example, fire) as well as the environment.

The use of methodologies related to mitochondrial DNA generally are restricted to samples showing a wide range of deterioration, such as very old skeletal remains. Lacking more complex analysis methods, this type of analysis provides resolution or approximation in the majority of cases, due to very specific technical features. Analysis using mitochondrial DNA has the limitation of not being as informative as analysis of nuclear DNA.

When identification cannot be determined using anthropological methods owing to the loss of phenotypic characteristics, identification of the remains will only be possible using molecular techniques (DNA test), a very complex process that requires the use of highly technical equipment and specialized professionals.



Prior to beginning the identification process it is important to have information about the group that will be studied, classified by type of population:

Closed population: the number of corpses coincides with the number of registered victims;

Open population: the number of corpses does not coincide with the number of registered victims, and in many cases will be higher.

DNA identification is based on the correspondence that exists between the genetic markers of progenitors and their descendants; i.e., genetic inheritance from fathers and mothers to their children. To establish this correspondence, one should obtain the genetic profiles of direct relatives. The genetic profile is a unique combination of the variants of the markers inherited from the parents, half from the mother and half from the father. The modern amplification technique using the PCR process allows us to obtain DNA from the cells of living tissues as well as from tissues of the deceased, including from those killed by exposure to extreme temperatures.

The scientific community has used three methods to demonstrate the ability to establish parentage with DNA:

1. Using markers called microsatellites in nuclear DNA from the genome of the nucleus of the cell, which represent the genetic profile of an individual;
2. With markers that are found exclusively in the DNA of the male sex chromosome and which are inherited by sons; and
3. Comparison of the sequence of regions of mitochondrial DNA, which is transmitted only through the maternal line, i.e., between a mother and her children, and among siblings through the mother.

The success of obtaining the profiles in tissues of dead bodies depends on how well the DNA is preserved. When tissue samples are very old the probability of success is greater when using mitochondrial DNA. In cases of burned remains, international reports indicate an average success rate of 50 percent in obtaining profiles.

Accepting cases, managing evidence, and maintaining chain of custody in DNA typing

The aim of these procedures is to guarantee that the chain of custody of evidence is maintained; to protect evidence against loss, deterioration, or detrimental changes; and to provide the necessary logistics to process a large number of samples.

Accepting cases

Decisions about accepting cases for DNA analysis depend on the proper administration of limited resources. Basically, the DNA laboratory is one of a variety of services used for identifying individuals, and DNA analysis should be authorized only when identification cannot be made using information provided by other resources. However, where DNA analysis might be required, samples should be obtained before evidence is handled, and they should be maintained as latent evidence, properly stored and safeguarded. This requires the formation of a regional network that can manage samples, and where similar conditions exist for DNA analysis in the network's different laboratories. The regional network's operational plans should include a standing arrangement for the exchange of biologists and geneticists so that a team of specialists can be mobilized to deal with massive numbers of cases. The network also should manage databases pertaining to the region's population.

Collecting samples for DNA analysis

The potential samples should meet basic standards if they are to be processed as latent evidence by a laboratory.

For forensic identification cases of individuals that either are not identified or are newborns, the first criterion to consider is the need to identify the individual, and hence, to transfer the corpse to petitioning families once the usual identification tests are exhausted. It should be understood that DNA testing is not a routine matter since it requires a long, labor-intensive, and costly procedure.

The person legally responsible for the analysis, that is the corresponding authority or the medicolegal expert, should decide, based on the guidelines described above, whether the sample to be taken will be processed as latent evidence. It is imperative that the appropriate authorities and experts take responsibility for maintaining the chain of custody for the evidence.

As part of the chain of custody, the appropriate authority or medicolegal expert should not only verify the validity of the corresponding sample, but guard against contamination or mixing samples being processed at the time (cross-contamination of samples), or contamination with material from the experts or others. Individual envelopes containing each sample should be stamped, sealed, and sent to the laboratory; the shipping documents should specify the envelope contents (type of samples) with the code of the sample. This code should also be written on the outside of the envelope so that it is easy to read. The shipping documents should be accompanied

by a sealed envelope containing a copy of the report that accompanies the samples, so that storage and custody for the sample can be prepared.

Priority criteria

The priority level of a case is determined by judicial authorities (criminal or civil judge, prosecutor, etc.) based on the following criteria:

- ◆ The evidentiary or investigative value provided by the results of DNA analysis (i.e., the corresponding authority accepts it or not as proof). The decision should be taken with prior consultation with the DNA laboratory, the immediate supervisor, the investigator responsible for the case, and a representative of the prosecutor's office;
- ◆ The probability (proposed by the DNA laboratory) that the results of the analysis will provide meaningful information in a reasonable amount of time;
- ◆ The deadlines established by the courts or other legal authorities;
- ◆ The order in which evidence is received.

Personnel responsible for collecting samples

Personnel with appropriate training, technical skill, and experience should collect the samples. The collection phase will define the quality of the analysis and permit better results in the allotted time. The regional network should have the resources to keep personnel up-to-date by carrying out exercises in the context of disaster plans.

Precautions during collection and dispatch of samples to the laboratory

When samples for analysis and reference samples are collected, a series of precautions should be followed to protect the personnel collecting the sample as well as to protect the sample itself. The sample can be affected if the process is not secure.

Protection of personnel

When handling human biological materials, one must assume that they contain dangerous pathogens (HIV, hepatitis, tuberculosis, meningitis, etc.) and be a possible source of infection. For this reason the universal precautions outlined below should be followed:

- ◆ Prevent, at all times, direct contact by the worker with the sample, using gloves, masks, gowns, or other protective clothing;
- ◆ Prohibit the consumption of food, drink, and tobacco products while handling the sample;
- ◆ Maximize asepsis and use disposable materials whenever possible. Once sample collection is complete, place all used disposable materials in containers for biological waste, and follow standards for disposal of biological waste;
- ◆ Recommend vaccination for personnel in contact with samples;

- ◆ When sample collection takes place in the autopsy station, extreme precautions should be taken.

Protection of samples

Many processes can affect the integrity of a sample and, therefore, the possibility of obtaining a genetic profile from the biological vestiges existing in the sample. In some cases these processes are inherent in the sample, and others can occur when collection and shipment of the samples to the laboratory are done incorrectly. These processes include:

- ◆ **Contamination by human biological material.** This occurs when human biological material is deposited at the site of the event or in the corpse following the event. It can be caused by onlookers, family members, or persons involved in the investigation who, accidentally or out of ignorance, contaminate the sample. This occurs frequently when minimal precautions when collecting evidence are overlooked or packaging is defective.
- ◆ **Contamination or loss during transfer of biological evidence.** This occurs, usually accidentally, during the transfer of evidence from one site to another and can result in the contamination or loss of a sample. It happens most frequently when hair samples are moved.
- ◆ **Microbiological contamination.** This type of contamination occurs when microorganisms develop, possibly as a result of humidity or high temperatures. Normally the microorganisms grow or proliferate because of defects in packaging or storage prior to sending the samples to a laboratory.
- ◆ **Chemical contamination.** This makes it difficult to amplify and extract DNA. It occurs when samples are immersed in preservatives such as formalin or when chemicals have been used in previous tests (for example, fingerprinting), thereby compromising DNA analysis.

Basic precautions

The contamination described above can be avoided or minimized if the following basic precautions are observed:

1. Isolate and secure, as quickly as possible, the scene of the event. Biological evidence should be the first evidence collected unless circumstances prohibit it;
2. Use clean gloves and change them frequently, especially when handling biological evidence likely to come from different sources;
3. Avoid speaking or sneezing on the samples. Use a mask;
4. Wear a gown or other protective clothing;
5. Use disposable instruments, and when possible use them only once, or clean them thoroughly between picking up each biological sample;
6. Do not add chemicals to preserve the samples;

7. Pack each sample separately. Whenever possible pack the samples in paper bags or cardboard boxes. Avoid using plastic containers;
8. Once the samples have been collected, throw used disposables (gloves, points, papers) in bags or containers for biological waste. Standards for disposal of biological waste should be followed.

Systems for packing and preserving samples

It is imperative to correctly preserve the samples from the moment they are collected until they arrive at a laboratory since the DNA in biological evidence—especially in wet and liquid samples—can begin to degrade within a few hours. Accordingly, proper packaging is very important and liquid evidence, soft tissues, organs, and wet evidence (if for some reason it can not be dried) should be kept refrigerated, including during shipping.

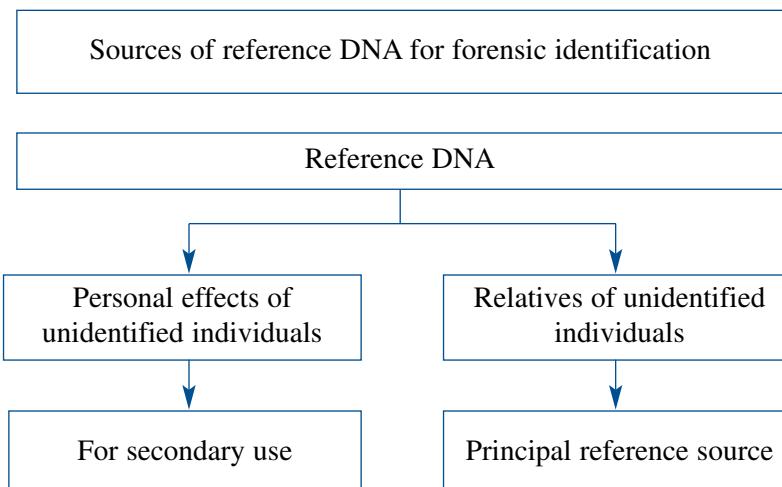
It is also very important to correctly identify and seal all receptacles (e.g., tubes, bags, boxes, etc.) with tape thereby guaranteeing the authenticity and integrity of the samples. Recommended packing and shipping procedures are outlined below:

1. **Identification of the samples.** There should be enough space on all of the receptacles to identify the samples and to write the following:
 - Reference number of the sample;
 - Type of sample;
 - Ownership of sample, and location.
2. **Chain of custody.** There also should be a space dedicated to the chain of custody with the name and signature of the person who collected the evidence, and the date and hour of collection.
3. **Packaging.** Packaging for samples or remains that should be sent to the laboratory are described below:
 - Jars or receptacles with liquid evidence, organs, soft tissue, etc. These receptacles should have screw-on lids or airtight closures; they should already have been sealed with tape and correctly identified; and should be kept refrigerated and sent to the laboratory under refrigeration as soon as possible.
 - Dry, sterile swabs. Swabs used to collect samples will be packed in small, cardboard boxes commercially designed for this purpose. This type of box protects the swabs and allows them to completely dry out. Once identified, they will be sealed with tape and sent without refrigeration to the laboratory. If it is not possible to obtain specially designed boxes, once the swabs have been used to collect the biological specimen they should be identified and numbered, placed in a protected area, and allowed to dry completely at room temperature before being placed in a shipping container. Once dry, the swabs can be placed in a correctly identified container, sealed with tape, and sent to the laboratory.
 - Samples with dry stains. Each sample is placed on top of paper (to avoid losing biological evidence such as hairs, scabs, etc.) that will be folded and

placed in a paper bag, sealed with tape, and correctly identified. This should be sent to the laboratory without refrigeration.

- Hairs, scabs or skin, nails, etc. This kind of material should be collected in small pieces of paper that will be carefully folded and put in a paper bag, sealed with tape, and correctly identified. This should be sent to the laboratory without refrigeration.
- Bones and teeth. These should be placed in paper bags and cardboard boxes that are sealed with tape and correctly identified. They can be sent to the laboratory without refrigeration. If tissue is still attached to bones, airtight, plastic receptacles should be used. These receptacles should be sealed with tape, correctly identified, refrigerated, and sent to the laboratory as soon as possible.

Collection of reference samples



Collection of reference samples from living subjects requires legal authorization and informed consent given by the person providing the sample. A document authorizing collection of the sample for genetic analysis for the purpose of identification should be signed. In the case of minors or mentally disabled persons, there should be parental or custodial consent in addition to legal authorization.

Conclusive samples from living subjects

Blood. Blood is the classic, conclusive sample used for obtaining DNA. If a person has received a blood transfusion in a period less than three months prior to sampling it is advisable to use buccal cells or hair follicles as reference samples, since it is possible to detect DNA from the provider of the blood, at least in a short period after transfusion. Blood can be obtained by venous or capillary puncture.

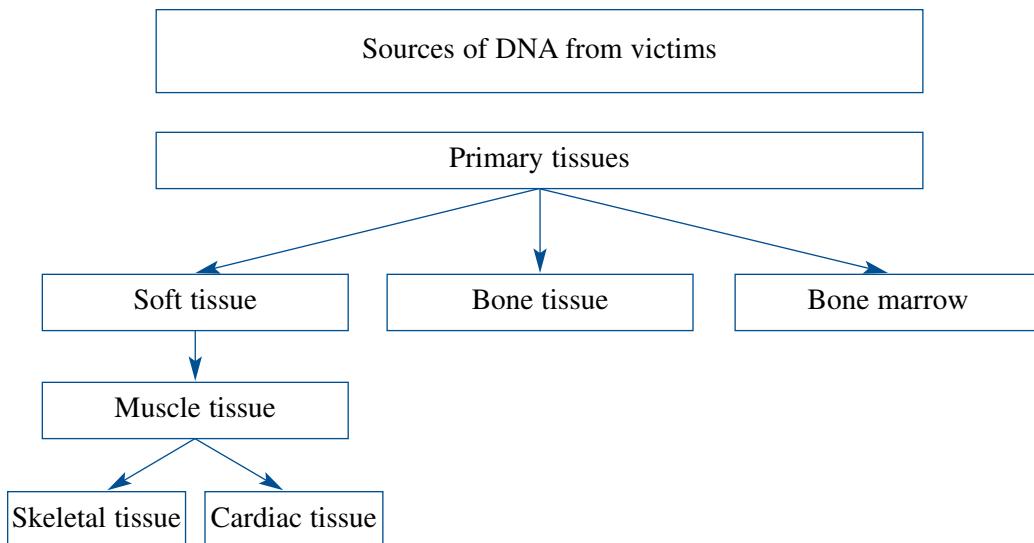
Buccal epithelial cells. These cells are collected from the inside of the subject's cheeks, using sterile, dry swabs. Two samples are taken: one swab is rubbed on the

inside of the left cheek, and another swab is used on the right cheek. The swabs should be identified and left to dry at room temperature in a protected area. They must not be placed in a container until they are completely dry since the bacteria in saliva proliferate rapidly in moist conditions and will degrade DNA.

Using the small conical brushes or swabs typically used for endocervical samples is appropriate for buccal cell samples, particularly since they dry easily. The sample should be taken at least one hour after the subject has eaten to avoid the presence of any food in the sample, or the subject should rinse his or her mouth thoroughly before the sample is taken.

Hair follicles. Between 10 and 15 hairs with roots should be pulled from the subject.

Conclusive samples in dead bodies



Conclusive samples in well-preserved bodies

Post mortem blood. A sample of about 10 ml of blood should be drawn into a tube containing an anticoagulant (EDTA type). If blood is needed for other analysis, additional samples should be collected.

Skeletal muscle. Select two skeletal muscle fragments (weighing about 10 g and approximately 2 cm wide) from the best preserved area of the body, and place them in a plastic container that has a wide mouth and screw-on lid. This type of tissue is preferable because along with cardiac muscle, it is the most resistant to decomposition.

Teeth. If there are doubts about the preservation of the corpse, it is advisable to extract four teeth, preferably molars, and save them so that exhumation of the body for identification purposes can be avoided. Prior to the extraction, a dental chart should be completed.

Conclusive samples in charred corpses

Despite the external appearance, the stability of DNA at high temperatures allows genetic analysis in corpses where charring is not complete by using fragments of skeletal muscle from deep regions of the body, and from semi-solid blood that remains inside cardiac cavities. If charring is total, it is advisable to contact the laboratory for an evaluation of the available samples and their condition to determine which would be most appropriate for analysis.

Conclusive samples in decomposed or skeletonized corpses

Bones. Remaining decomposed tissue should be removed from the bone, and a long bone, preferably the femur, should be used. If it is not possible to obtain this sample, the laboratory should evaluate available samples and their condition to determine which would be most appropriate for analysis.

Teeth. After a dental chart has been completed, select at least four teeth, molars where possible. The samples should not have been damaged or subjected to endodontia.

Conclusive samples in embalmed corpses

In embalmed corpses (those preserved artificially using preservatives such as formalin), DNA undergoes degradation that in most cases makes analysis very difficult. To select the most appropriate samples it is advisable to contact the laboratory that will carry out the analysis so they can evaluate the best samples in relation to the molecular biological techniques they will use, the type of substances used for embalming, and the age of the corpse, among other factors.

Other reference samples from the deceased

When it is not possible to exhume a body to obtain conclusive samples, or when there are no living relatives available to assist in the investigation, we can use other strategies, such as:

- ◆ Analysis of biological remains of the deceased found in hospitals. It is possible to study blood samples, biopsies preserved in paraffin, histological preparations, etc., of the deceased that exist in hospitals. It is not advisable to analyze tissues kept in formalin since this substance modifies DNA, making analysis difficult if not impossible.
- ◆ Analysis of biological remains of the deceased present in the home environment. Items that might have biological traces of the deceased, such as envelopes that might have saliva traces on the flap and seal, razors, combs and hairbrushes, etc., can be analyzed. This type of sample should be authenticated through genetic analysis of relatives, since samples may have been provided by family members who are involved in the judicial process. Once all usable biological material has been removed from the evidence, it can be stored at room temperature.

Disposition of the evidence

- a) The analyst should ensure, to the extent possible, that enough of the sample remains to carry out new analyses if required. In cases in which all of the evidence has to be used to obtain interpretable results, the party soliciting the study should be consulted to ensure that they have considered legal implications of destroying the sample.
- b) Once the analysis has been completed, the item of evidence should be returned in the original packaging (including the original labels), and properly sealed. The returned evidence should include clear storage instructions, and a certificate should be issued that states it is latent evidence.
- c) The analyst who is responsible for repacking and resealing the evidence should note the respective contents on the return form. The person responsible for sending the package is responsible for written tracking reports of the shipment.
- d) The DNA samples, electropherograms, and original results of the study will remain in the custody of the DNA laboratory. If the sample must be transferred to another laboratory, record of the transfer should be noted on the form included in the case file.

In this section we have touched on the main elements of forensic DNA studies used for identification in disasters. The bibliography at the end of this chapter lists important references that expand on the material presented here. Because it is a complex topic, it is also advisable to seek the services of a specialist in DNA analysis should any doubts arise.

FINAL DISPOSAL OF CORPSES

The final disposal of corpses can be done by burial or interment, which is almost universally practiced. In many countries, though, cremation is becoming more prevalent.

It might be necessary to preserve the body until it can be taken to the vigil or public viewing site or finally disposed of. For this reason, preservation is an important issue in the management of massive fatalities in disaster situations.

A variety of methods can be used to preserve the remains of victims, depending on the condition in which corpses are found. Traditionally the following methods are used:

- ◆ *Low temperatures:* The remains are kept in containers that are refrigerated with ice or other systems;
- ◆ *Chemical processes:* Substances are injected intravenously or placed or injected into the cavities or other parts of the corpse;
- ◆ *Immersion in liquids;*
- ◆ *Burial.*

Low temperatures

Maintaining a body at low temperatures is an ancient method of preservation. It can be achieved by using cold areas or rooms to maintain or freeze the remains, by using ice to maintain low temperatures (dry ice is usually recommended), or through any process that balances temperature and attains the desired result.

Since the time needed to complete medicolegal work will vary, it is vital to control the temperatures at which human remains are kept. This is important when using refrigerated chambers, especially facilities such as meat packing plants, boats, and refrigerated trucks or containers.

For example, freezing human remains can hinder the examination process. Freezing causes tissues to dehydrate which changes their color; this can have a negative impact on the interpretation of injuries, as well as on attempts at visual recognition by family members. Rapid freezing of bodies can cause post-mortem injury, including cranial fracture. Handling bodies when they are frozen can also cause fracture, which will negatively influence the investigation and make the medicolegal interpretation of the examination results difficult. The placement of one body on top of another in freezing temperatures can distort the faces of the victims, a condition which is difficult to reverse. Also, the process of freezing and thawing can accelerate decomposition of the remains.

Chemical processes

Using chemicals to process human remains has been known since ancient times, as can be seen by the famous Egyptian mummies and others discovered in tombs during archaeological excavations.

Although the injection of chemicals, especially formalin solutions, into blood vessels has been the most common method, similar results can be obtained using other solutions as well as by placing substances inside cavities or on the outside of bodies or body fragments.

When the integrity of a corpse is compromised, i.e., it is decomposed or in fragments, injection of chemicals is not possible. Other methods can be used to prepare the body or body parts in these situations, including the use of solid preservatives and proper wrapping of the remains. One method, which is explained in more detail in the next section, involves applying a substance to the remains that can prevent or interrupt the process of decomposition, eliminating or reducing disagreeable odors, and preventing fluids from leaking from the body during transport or the vigil. We have used powdered formaldehyde and powdered calcium hydroxide as well. After these substances are applied, the body or fragments are wrapped in several nylon or plastic bags and sealed completely with adhesive tape. This should only be done after all of the necessary medicolegal processes involved in identification and determination of the cause and circumstances of death have been completed.

Embalming

Embalming, also known as “artificial mummification,” is one procedure that can be used on the dead body. It is an ancient technique that has been maintained over centuries and similar practices continue today. Embalming is addressed in the health legislation of many countries depending on their social, health, and cultural characteristics, and as such is of historical, religious, health, and social interest. The technique requires knowledge of anatomy and chemistry and the personnel carrying out the procedure must have specialized training.

The earliest mummification attempts in Egypt date to about 3200 B.C., and they probably began to mummify the dead intentionally, using embalming techniques, around 2600 B.C. This was not only an Egyptian practice. It is known to have been done by Arabs, Jews, Chinese, and Incas, who used balm, which is a natural sap, and aromatic substances, hence the term “embalm.” Present day disinfectant fluids have replaced these balms.

Some authors define embalming simply as the preparation of a dead body for preservation, while others make a distinction between transitory preservation and body preparation. In general, embalming is the procedure used to preserve a body for more than 72 hours after death; transitory preservation is meant to maintain the body in an acceptable state for 24 to 72 hours after death. Preparation of the body is understood as a more complex procedure that is carried out on a corpse found in some stage of decomposition and that attempts to minimize the effects of and slow down decomposition.

Regulations about embalming differ in each country. Depending on the reasons for requesting the procedure, solicitants might be family or associates of the deceased, representatives of diplomatic missions or foreign institutions, government or state officials, or the responsible judicial or health authorities. Authorization to perform the procedure is given to mortuary services, medicolegal institutes, and other qualified services as stipulated in local laws.

There are different motives for embalming, among which we should note the repatriation or transfer of a corpse out of a country, preparation of an unidentified corpse for viewing, scientific or teaching purposes, state or government interests, and for other objectives as determined by the corresponding health or judicial authorities.

Embalming techniques have evolved throughout history. Initially, three basic types of were done depending on the status or class of the deceased, each method using different types of materials. The most complete and labor intensive basically involved placing aromatic essences in the cavities of the body and covering the body in salts. First, an iron hook was used to extract the brain through the nostrils, and fragrant infusions were injected through the openings. The intestines were removed through a small incision in the torso, washed in palm wine, and infused with aromatic substances. The body cavities were then filled with myrrh, cassia, and other extracts. The incisions were closed and the body was covered with natrum (a compound of sodium carbonate and sodium bicarbonate). Seventy days later the body was washed, wrapped with strips of linen cloth that had been smeared with resins, and finally placed in a wooden coffin that was carved to resemble the human figure.

While the process has changed over the centuries, the principles have remained the same: i.e., the substitution of blood and fluids with preservatives, especially liquid disinfectants, which depending on the case are injected into blood vessels or into body cavities. Today, embalming can be done on dead bodies whether or not they have undergone autopsy. We should point out that in the 1970s embalming was practically obligatory in certain countries.

In the following section we will give further details about the most commonly used techniques according to the condition of the body.

Requirements for embalming or body preparation

Among the most important requirements to take into account for these procedures are:

- ◆ Trained technical personnel;
- ◆ Appropriate equipment and instruments;
- ◆ Preservation materials; and
- ◆ Adequate working area.

The personnel responsible for embalming should have basic knowledge of human anatomy and chemistry which can be obtained through academic training; there is also international certification in this discipline. Ideally, certified and highly qualified personnel who are dedicated to this type of work should assist in emergency situations.

If this is not possible, there should be personnel who have basic knowledge and training and who are supervised by competent specialists.

Instruments and materials for corpse preparation are not very different from those used for surgery and in autopsy settings. At a minimum, they should include:

- ◆ Straight and curved scissors
- ◆ Scalpel or bistoury
- ◆ Dissecting forceps
- ◆ Grooved director
- ◆ Trocar (different sizes)
- ◆ Suture thread and needles
- ◆ Filling material
- ◆ Embalming fluids
- ◆ Plastic or nylon bags
- ◆ Protective clothing and shoes (surgical gowns, caps, masks, etc.).

The area used for embalming or body preparation should meet certain minimal criteria appropriate for a variety of situations, and taking into account the following principles:

- ◆ Adequate privacy and lighting;
- ◆ Placement of the remains on an autopsy table or comparable surface;

- ◆ Availability of water, preferably an abundant amount of running water;
- ◆ Good natural ventilation, or if that is not possible, exhaust fans. Air conditioning as the sole means of air circulation is not recommended because of the toxicity of gas fumes associated with preservative substances, especially formalin;
- ◆ Smooth and polished floors and walls that facilitate cleaning and hygiene. In field conditions the area should be continually cleaned, even in the case of dirt flooring;
- ◆ Adequate control of the disposal of liquids and of biological matter extracted from the body.

Embalming techniques without autopsy

Any of the techniques described below require skills acquired through special training, and merit a course dedicated to the subject. However, we will summarize the steps of the process here.

The body should be placed in a supine position with the extremities extended. An incision is made inside the upper left arm and muscle mass in the arm is separated until the brachial artery is found and lifted. Two ligatures, 5 cm apart, are passed under the artery. A transverse incision is made and a trocar is inserted in the artery pointing to the lower part of the body, as the upper ligature is tightened. This ligature is then loosened, the direction of the trocar is changed, and the ligature is tightened again, permanently. Once insertion of preservative liquid is complete, the incision is sutured.

In the cranial cavity solution can be injected through the carotid arteries or by inserting a trocar through the nose by way of the cribriform plate of the ethmoid bone.

Embalming technique for body fragments

Fragmentation of bodies can be very extensive in events such as aviation disasters, characterized by serious damage to blood vessels and other tissues. In such cases, an attempt should first be made to reconstruct the fragments using sutures, especially of the major vessels, followed by injecting preservative liquids.

Alternatives should be sought for preparing body parts or fragments where major damage has occurred to tissues as a result of crushing, burns, and other causes. This is especially important when it is necessary to transfer the bodies and comply with established health regulations. One proposal is to preserve the fragments with solids rather than the liquids typically used. Powdered forms of calcium hydroxide (lime), zeolite, and formalin, among others, adhere to the surface of the fragments and can be placed inside cavities, in small slits and lacerations, etc. Application of these substances is followed by placing the fragments in plastic bags, which are then tightly wrapped in adhesive tape. These bags are relatively airtight and generally prevent leakage of body fluids that occurs during handling, which helps to maintain a level of hygiene as well as limiting foul odors during handling.

Embalming bodies of newborns and fetuses

When embalming a fetus, it is advisable to inject preservative fluid through the umbilical vein. The vein is located in the umbilical cord and the fluid is introduced by gravity or by using equipment that pumps the preservative (approximately 1 liter) into the fetus.

The embalming technique used for a newborn is similar to that used for a fetus. However, we can also recommend a technique similar to that used in adults. Fluid is introduced through the brachial, axillary, or femoral artery and cavities are filled with material soaked in preservatives. The only difference is the volume of liquid preservative used: depending on body surface, it would be between 1 and 2 liters for a newborn.

Transitory preservation of a dead body

Transitory preservation of a dead body can take place, as in embalming, whether or not an autopsy has been performed. When an autopsy has not been performed, the arterial route is used (as for embalming), with the difference that the fluid has a lower concentration of formalin and the volume is much less, varying between 2 and 3 liters for adult bodies.

When autopsy has been performed, after the cavities are filled, transitory preservation can be successfully done by soaking the fill material in preservation fluids or including powders or solid preservation materials as part of the fill material.

Techniques for dead body preparation

Dead body preparation includes the work done on a body or body parts with the aim of minimizing the effects of putrefaction and preventing its progression.

In general, it is based on the same techniques used for embalming, although prior to these it might be necessary to expel gases or eliminate putrid matter. At times, this can lead to forced skeletal or mechanical reduction, which leads to the elimination of the mass of putrilage, leaving the remains in an almost total skeletal phase, even though tissue remains adhered to the bone surface, especially the joints.

Gases can be expelled by selective puncture in affected areas, especially in the area of the perineum, male scrotal sacs, and the female mammary folds, among other sites. A certain amount of gas can be released to decrease facial swelling by making incisions on the interior of the cheeks, and pressing the cheeks with gauze to attempt to expel gases.

In these cases it is advisable to place the remains in plastic bags with preservatives or antiseptics, and wrapping them tightly with adhesive tape as was described for the preparation of body fragments.

There are many other techniques, depending on the case, and specialized texts should be consulted.

Aesthetic reconstruction of features

Damage caused to the human body by disasters is difficult to conceive, and it varies widely. Defining reconstruction methods for every case is impossible, so we will only mention a few of the more common situations that might demand our involvement.

Suture of each of the wounds and any incisions made is an essential measure. Very strong glues that dry instantly and are readily available are recommended for this process.

Special reconstruction techniques can be used to attempt to restore facial features. To restore some of the features of the eye that have been lost, almost always due to trauma, compresses moistened with water are placed on the eyes for 30 minutes to 1 hour, and then glycerin or physiologic saline solution is injected in the space behind the eyeball, restoring its spherical shape. When the eyeballs have completely lost their shape, it is necessary to resort to prostheses, or at least fill the eye sockets, especially if the body must be prepared for visual recognition. In these and other cases, the eyelids can be closed with small sutures on the top and bottom lids. The mouth can be closed using sutures in both lips made from the inside.

Facial swelling might occur because of gases. As mentioned earlier, incisions can be made on the inside of the cheeks and pressure applied to the cheeks with gauze to attempt to expel gases, thereby recovering a more normal appearance of facial features.

The use of cosmetics, prostheses, wigs, and other materials that favor the aesthetic, above all of facial features, should be adapted to the case in question. It is important to take into account the age, sex, race, and other distinguishing features of the subject, as well as general customs in the country.

Preservative materials

A variety of substances for preservation are recommended by different specialists. In remote times, the Egyptians, Arabs, and Chinese used balm and resins (natrum, myrrh, and tars) which have been replaced over time with alcohol, glycerine, white arsenic, sodium chloride, potassium nitrate, and zinc chloride, among others.

Many recommend that the preservative solution for injection into dead bodies should be made from a basic solution of 40% formol and carbolic acid, while others use a combination of formol with alcohol and glycerine (for each liter of solution of formol, one half liter of alcohol is used). Most recommend the use of formol, starting with 10% concentrations, together with glycerine; if formol is not available, 20% zinc chloride in alcohol or glycerine can be used.

One recommended formula has the following ingredients:

- ◆ 30% formol, 300 ml;
- ◆ 80 proof ethanol, 700 ml;
- ◆ Glacial acetic acid, 5 ml; and
- ◆ Phenol, 20 gm

This is injected in a quantity that approximates the blood volume of the subject when alive.

Immersion in liquid

While not a true form of preservation (except as used in anatomy classes in most schools of medicine), this is an option that might be considered when there is an evident delay in burial for technical or other reasons.

It is well known that putrefaction in submerged bodies is slower than in bodies exposed to air, so it is possible to immerse bodies in tanks, pools, or other receptacles when there is no other option for temporary preservation.

Burial

Based on the same principles outlined above, placement of bodies below ground can facilitate temporary preservation. Temporary burials can be justified in disaster situations until conditions allow for the transfer of the remains from the disaster site to their final destination.

In cases of temporary burial, the use of documentation and markers of the burial site should be as strictly followed as for final burial in officially established cemeteries.

We hope that with the information provided in this chapter, although in the most difficult of working conditions and without the presence of true experts, a professional with basic training can deal with the diverse and complex tasks required for managing massive fatalities that can occur in major disasters.

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CHAPTER 3: HEALTH CONSIDERATIONS IN CASES OF MASS FATALITIES

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The facts indicate that there has not been any epidemic generated from large numbers of dead bodies. In the event that mass fatalities from epidemics occur, the dead body poses a limited risk only for certain pathogens. That minimal risk is determined by very specific circumstances or situations. This chapter focuses on the real risks that the bodies of the dead in disaster situations have for public health, contrary to certain deep-rooted myths.

INTRODUCTION

The assumed infectious risk that a dead body poses has been discredited by science through numerous observations and by epidemiological and scientific evidence, which while scarce, is documented. This is an initial attempt at developing a chapter to relate the epidemiology of human health with exposure to decomposing bodies.

This poses an enormous challenge. In spite of the importance of the subject and of attempts made to demystify the infectious risk of dead bodies, a definitive analytical protocol still has not been developed that makes it possible to objectively quantify whether the presence of dead bodies increases health risks for the living.

This document should serve as a starting point for stimulating interest among the experts in the design of such a tool, or, at least, to provide a critical assessment of the scientific evidence presented that can lead to the measurement of risk. All the conclusions and assertions made here are based on observation and descriptive epidemiology.

The commonly held belief that human and animal corpses pose a public health threat has resulted in confusion among authorities and the general public. This confusion has frequently led to incorrect prioritization and use of scarce resources in crisis situations, and these errors often have caused more deaths and illnesses than caused by the disaster itself. For example, after the scourge of Hurricane Mitch, the limited fuel available was used for massive cremations of dead bodies.

One of the principal obstacles that authorities and health professionals face when managing a large number of dead bodies is the presence of myths about the bodies. These myths have become so deeply ingrained in the human psyche that they are almost instinctual. Myths, however, are simply that. As scientists it is our job to convince a very skeptical public that dead bodies do not pose a danger. The most effective way to eliminate these myths is to compile what is actually known about whether

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the presence of a large number of dead bodies poses risks for causing illness or epidemics.

In order to discredit all of the myths surrounding dead bodies, we will thoroughly review the available scientific evidence that challenges the supposed epidemiological risk presented by corpses. It is necessary to precisely define the risk/exposure topic, so we will analyze different scenarios in which this relation could arise:

- ◆ Corpses that might or might not transmit the germs that caused the death of that person or animal;
- ◆ Corpses that might or might not transmit the germs even though the cause of death was infectious; and
- ◆ Corpses that might have indirect responsibility for an increase in the disease index, either by effects on the environment (cremation or burial), effects on the mental health of the survivors or rescue personnel, or excessive outlays of human, financial, and material resources for managing dead bodies to the detriment of services for the living.

Finally, we will examine the relationship that exists between the environment and human and animal bodies; the possibility that a large number of dead bodies will affect the environment; the steps that should be followed to prevent deterioration of the natural environment of the affected area; and necessary precautions for correct disposal of animal corpses, regardless of their size or number.

MYTHS

The myths surrounding corpses are completely unfounded and border on the ridiculous. These beliefs have developed and become ingrained in the psyches of populations with the passage of time. They normally are caused by distortions of religious norms, by superstition, or by simple observation of a presumed reality. We distinguish between religion and superstition because the first generally refers to a set of formally established doctrines. Superstition, on the other hand, arises from a poor understanding of religious beliefs, a mixture of socio-cultural factors, scientific facts, and, even, science-fiction (see Chapter 4).

Anthropologists and other scientists recognize that religious customs, superstitions, and myths have a historical root or are based on empirical observations of actual events. For example, disposal of the dead was a matter of major concern during the infamous “black plague” that ravaged Europe; the plague was a major event and gave rise to the appearance of many of the myths concerning corpses.

The following section examines the realities behind the myths about the danger of corpses causing epidemics.

EPIDEMIOLOGICAL RISK OF DEAD BODIES IN AREAS WITH ENDEMIC DISEASES

We should be very conscientious by emphasizing that a dead body is the result of an epidemic and not the cause of the epidemic.

When a natural disaster happens, deaths occur mainly from trauma as a direct result of the type of disaster. In the management of dead bodies, care should be taken with certain endemic diseases (for example, *Vibrio cholerae* and *Mycobacterium tuberculosis*, among others), depending on the type of etiology, when priorities for corpse disposal are considered. Care should also be taken because certain vectors (flies, fleas, rodents, or others) can transmit microorganisms harbored in the corpse (host), such as typhus or plague. At any rate, it is important to note that even in these cases, the presence of dead bodies cannot be considered a significant public health threat. The reason dead bodies pose such a limited health threat is that as the corpse desiccates, the body temperature drops quickly. Even the most resistant bacteria and viruses die quickly in an animal that has died recently. This makes it extremely difficult for microorganisms to transfer from dead bodies to vectors, and from vectors to human populations.

The only thing we can definitively say about dead bodies in disease endemic areas is that they can be carriers of the etiologic agent, without their being the cause of epidemics. Scientific research has not been able to link the presence of dead bodies as the cause of an epidemic in any of the recent disasters or in situations with a great number of fatalities.

Cholera is a concern in endemic areas since *V. cholerae* can have a devastating effect. The concurrence of the cholera season in endemic regions and a disaster with mass fatalities has been a scenario that has caused major concern for more than one public health officer. Overcrowding, poor sanitation measures, and degraded drinking water systems can exacerbate the spread of the disease almost exponentially.

In such cases, corpses might play an important role in the increased rate of infection, especially if there are decaying bodies in contact with water sources.

In Zaire, approximately 12,000 Rwandan refugees died in July 1994 due to an epidemic cholera outbreak. It was later determined that the area where the refugees were located was endemic for this disease.¹ Popular belief attributed the worsening of the outbreak to the presence of corpses, but it could be demonstrated that other factors, such as overcrowding, poor sanitation measures, and the lack of drinking water, were the primary causes.

The presence of dead bodies in this refugee camp proved to be only a cofactor when the tragedy was examined, owing mainly to the fact that those handling the bodies did not observe necessary standards of hygiene, which means they became transmitters of the disease. In a few other cases it was due to the fact that dead bodies contaminated drinking water sources.

¹ Armstrong D, Cohen J (eds). "Geographic and Travel Medicine: Cholera." Infectious Diseases, Vol. 2; Mosby: London, 1999.

It is impossible to determine to what extent the dead bodies were responsible in the appearance of the Zaire outbreak, but it is very clear that the cholera epidemic might have declined dramatically if the authorities and emergency personnel had prioritized sanitation measures, housing, and the issues of water and waste management in the refugee camp. In conclusion, it cannot be said that the Zaire incident could have resulted in fewer deaths if body disposal had been a priority.

There are several recommendations for proper management of dead bodies in situations such as that described in Zaire:

- ◆ Strengthen personal hygiene measures both of relief and humanitarian workers and of the community in general;
- ◆ Disinfect bodies with a chlorine-based solution;
- ◆ Monitor transport vehicles;
- ◆ Prevent direct contact between the corpse and family members. Bodies can be delivered to the family members in airtight boxes so that they can be buried rapidly in accordance with the customs of the community;
- ◆ In this and many other situations, avoid exposure of the dead bodies to animals. The best way to avoid this is to bury the body.

Public beliefs have also associated salmonellosis with the presence of dead bodies. *Salmonella*, like *V. cholerae*, is a very resistant bacterium.

Chile has experienced serious problems with salmonellosis, and it is regarded as an endemic area. The country had a salmonellosis epidemic between 1977 and 1986 at a time when statistics showed improvement in systems for drinking water and waste disposal due to better sanitation procedures.²

In general, we can say that conditions of overcrowding and poor sanitation measures are directly related with cholera and salmonellosis. There are no conclusive data to quantify the exact effect that dead bodies might have on the spread of salmonellosis, but it is possible that such a connection does exist. Although some authors have linked the spread of salmonellosis to the presence of dead bodies, the connection is as tenuous as the relationship between illness, corpses, and cholera.

Popular belief maintains that dead bodies played an active role in some of the salmonellosis epidemics that affected Chile. At any rate, as with cholera, the bodies are only regarded as a cofactor. When situations in Chile and similar cases are carefully examined, it can be concluded that good sanitation infrastructure does not necessarily indicate good health practices in the general population. This important lesson has been difficult to learn in many communities and has proven to be an important cofactor when the relationship between corpses, sanitation measures, and epidemics is examined.

² Fica AE, Prat-Miranda S, Fernandez-Ricci A, D'Ottone K, Cabello FC. "Epidemic typhoid in Chile: analysis by molecular and conventional methods of *Salmonella typhi* strain diversity in epidemic (1977-1986) and nonepidemic (1990) years". J Clin Microbiol 1996; 34(7):1701-7.

Both *Salmonella* and *V. cholerae* are extremely resistant and tenacious organisms. Cholera and salmonellosis outbreaks are serious events, especially in low-income communities. However, the role that high numbers of dead bodies play when they exist in areas with endemic diseases requires a very critical assessment of whether the following can be verified:

- ◆ The area is endemic for the disease in question. Certain baseline data are needed to judge the level of disease in a given area;
- ◆ The disease can survive in a dead body for a considerable period of time;
- ◆ The confluence of the factors previously referenced, together with the local environment and a third potential event (for example, a disaster), make the presence of dead bodies a greater hazard than in “normal” conditions.

No single factor can increase the risk due to the presence of corpses. Furthermore, we know that while bacteria such as *Salmonella* or *V. cholerae* are resistant, the majority of these microorganisms do not survive for long after the death of the host.

Other diseases should be taken into account: for example, it has been verified that the human immunodeficiency virus (HIV) can survive for 16 days in a corpse, and at temperatures as low as 2°C.³

Tuberculosis should be mentioned because it is highly contagious. It can pose a hazard especially during autopsy or handling of the body when air is exhaled from the respiratory tract.⁴ Several simple techniques dramatically reduce the risk of contagion from this disease. These include placing a cloth over the mouth of the body when it is being handled to prevent the escape of air,⁵ and ensuring adequate ventilation in the area chosen as a temporary morgue, especially when there are large numbers of corpses.⁶

In Table 3.1 we list the principal diseases that should be avoided by those responsible for managing corpses in order to avoid possible contagion.⁷

Table 3.1. INFECTIOUS RISK OF HUMAN CORPSES

Bacterial infections	Viral infections
Tuberculosis	Gastrointestinal infections
Streptococcal infections	Creutzfeldt-Jakob disease (“mad cow” disease)
Gastrointestinal infections	Hepatitis B
Meningitis and septicemia produced by meningococcus	Hepatitis C
	HIV infection
	Hemorrhagic fever

³ Demiryurek D, Bayramoglu A, Ustacelebi S. “Infective agents in fixed human cadavers: a brief review and suggested guidelines.” *Anat Rec* 2002;196.

⁴ Gershon RR, Vlahov D, Escamilla JA, Badawi M, McDiarmid M, Karkashian C, et al. “Tuberculosis risk in funeral home employees.” *J Occup Environ Med* 1998;40:497-503.

⁵ Healing TD, Hoffman PN, Young SE. “The infectious hazards of human cadavers”. *Commun Dis Rep CDR Rev* 1995;5:61-68.

⁶ Centers for Disease Control and Prevention (CDC). “Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health care facilities.” *MMWR* 1994;43.

⁷ Taken from Healing TD, Hoffman P, Young SEJ. Guide to infection control in the hospital. Second edition. International Society for Infectious Diseases; 2000. Ch. 42.

SCIENTIFIC BASIS OF THE ABSENCE OF EPIDEMIOLOGICAL RISK IN NON-ENDEMIC AREAS

There exists little evidence suggesting that dead bodies constitute a risk in areas that are not endemic for certain diseases.⁸ When a disaster strikes a community, authorities prioritize their actions to address the most pressing public concerns, that is, attending to the injured, the displaced, and the dead. Little time has been devoted to documenting the fact that dead bodies do not constitute a significant risk of infection during a disaster. At any rate, the evidence obtained from emergency operations and subsequent reconstruction projects would indicate that in the majority of the cases the dead bodies do not pose an appreciable risk for public health in areas where there are no endemic diseases. For a more thorough examination of this subject, we should review the scenarios before and after the occurrence of a disaster.

On 17 August 1999, one of the deadliest earthquakes in Turkey's history struck, resulting in approximately 16,000 deaths and more than 44,000 injured. The emergency teams that converged on the site dealt with Phase 1 of the emergency and Phase 2 of treatment. The teams worked for two-week periods to treat injuries, illnesses, and traumas that resulted from the incident. They dealt almost exclusively with surgery, births, trauma cases, and neonatal and post neonatal care. Infectious diseases played a very small or no role in the activities of the medical teams.⁹ The teams prioritized the search for buried survivors, treatment of the injured, and management and organization of the refugees and injured. Disposal of the dead was of secondary concern during this period.

To be objective about this example, we should emphasize that this case should be viewed with caution since the absence of epidemics can be explained in large measure by the good condition of Turkey's health system, particularly in the western part of the country.

The year 1998 was marked by one of the most devastating and deadly hurricanes in history. Hurricane Mitch devastated Central America. Flooding and landslides resulted in an estimated 10,000 deaths between 26 October and 2 November 1998. The flooding of roads and destruction of health centers hindered emergency relief efforts.

The immediate causes of morbidity and mortality were the landslides and floods. The emergency teams treated a great number of the injured immedi-

⁸ The absence of scientific evidence can be attributed to the following factors:

- Difficulty of carrying out investigations in crisis situations;
- Owing to the observations made during disaster situations, it is possible to conclude that there is no solid evidence linking dead bodies to the spread of the disease. Scientific evidence would have a relative impact in this regard;
- Finally, there is little interest on the part of scientists to corroborate a fact that has always been observed.

⁹ Halpern P, Rosen B, Carasso S, Sorkine P, Wolf Y, Benedek P, Martinovich G. "Intensive care in a field hospital in an urban disaster area: lessons from the 1999 earthquake in Turkey". Crit Care Med 2003;31:1589-90.

ately after the storm. A study of infectious diseases before and after Hurricane Mitch in the Nicaraguan community of Villanueva showed that the incidence of acute diarrheal illness and acute respiratory infection increased significantly.¹⁰ This study found that the incidence of acute diarrheal disease rose from 2,849 to 6,798 per 100,000 ($p <0.01$) after the hurricane. Specifically, they found that the incidence of acute respiratory infection increased from 295 to 1,205 per 100,000 ($p <0.01$). The evidence suggested that the increased incidence of these illnesses was attributable to flooding, poor sanitation measures, overcrowding, and damage to the basic infrastructure.

It should be noted that this study was unique in that it was carried out at the same time as relief operations. In fact, the study was used to assist the relief teams in prioritizing their activities. Thanks to the investigations, emergency personnel were able to prepare for an increase in patients with acute respiratory and diarrheal illnesses. Evidence was never presented to link the presence of dead bodies to these increased rates of infection. On the contrary, the lack of drinking water, poor hygiene, and overcrowding were indicated as the causal factors in the increase in these illnesses.

Many scientists consider poor policies, misconceptions, and myths to be partly responsible for the disaster caused by Hurricane Mitch. Many of the deaths, much of the property damage, and the chaos that surrounded the event could have been ameliorated, to some extent, if the authorities had had accurate information about disaster management, or if they had prioritized the relief activities in a more logical way. According to a study published after the hurricane, “The devastation in Central America following the 1998 hurricane (Hurricane Mitch) resulted more from economic and political policies than from ‘natural’ disaster.”¹¹ The authors conclude that the forced migration over the years of poorer populations from stable agricultural areas onto degraded hillsides and into floodplains made these people particularly vulnerable to the effects of the hurricane. Furthermore, the authors note that inappropriate emergency planning greatly exacerbated the death toll from Hurricane Mitch. The authors go so far as to say that the population settlements in degraded areas coupled with the failure to anticipate the disaster through massive evacuations or to respond effectively to the damages caused the loss of thousands of lives. Regarding this last point, it should be emphasized that attending to the care of survivors is clearly of higher priority than attending to the disposal of dead bodies in an emergency.

In addition to the evidence presented in the previous examples, many health institutions have disputed the assumption that dead bodies present a public health hazard. The World Health Organization (WHO) has repeatedly pointed out that there is a minimal risk for infection from dead bodies. In a document published in 2002, WHO established that: “Dead or decayed human bodies do not generally create a serious health hazard, unless they are polluting sources of drinking-water with faecal matter, or are infected with plague or typhus, in which case they may be infested with the fleas or lice that spread these diseases.”¹²

¹⁰ Campanella N. “Infectious diseases and natural disasters: the effects of hurricane Mitch over Villanueva municipal area, Nicaragua.” *Public Health Rev* 1999;27:311-9.

¹¹ Cockburn A, St.Clair J, Silverstein K. “The politics of natural disaster: who made hurricane Mitch so bad?” *Int J Health Serv* 1999;29:459-62.

¹² Wisner B, Adams J, editors. *Environmental health in emergencies and disasters: a practical guide*. Geneva: World Health Organization; 2002; p. 198.

According to scientists from the Water, Engineering and Development Centre (WEDC) of the United Kingdom, the relationship between corpses and epidemics has never been scientifically demonstrated or reported.¹³ The authors indicate that, contrary to popular belief, corpses rarely contaminate water sources and are not associated with the transmission of malaria or dengue; they also state that many of the hurried disposal methods constitute more of a hazard for public health than the corpses themselves. For example, mass cremations produce high quantities of smoke with airborne dioxin, resulting in significant respiratory problems.

The experience of WHO and the WEDC in managing incidents with large numbers of dead bodies and subsequent health related problems, supports the assertion that the presence of corpses plays a negligible role in the spread of infectious diseases.

The large quantity of evidence presented makes it possible to recommend to authorities to redefine priorities regarding disposal of the dead. Hasty disposal of dead bodies is unnecessary, particularly when this implies a failure to respect family members and their desire for a worthy burial in accordance with their beliefs and customs.

ANIMAL CORPSES

Many of the issues about human corpses directly correspond to those relating to animal corpses. Myths have been developed about animal corpses as well, mainly from events out of the past without any apparent scientific basis. The black plague, which left an indelible mark on the human conscience, was spread by animals, and their corpses were regarded as just as deadly as the live animals. We should consider, also, that animal vectors do spread a number of diseases among humans; the majority of the population believes that these vectors are dangerous whether alive or dead.

In most cases, the bodies of dead animals pose as little risk to humans as human bodies. That is, animal corpses constitute a public health hazard only in specific conditions.

An animal that has lived through its life cycle or has died from injuries does not represent any health hazard for humans. Massive animal deaths in cases of natural disasters are not a health hazard for humans, either. However, it is necessary to emphasize that animals that die from exposure to a disaster or as a consequence of injuries, and that have had a specific communicable disease, may pose a risk to the population.

Zoonoses are becoming an increasing threat to human populations. However, most zoonotic infections do not survive in the dead body of an animal. Like diseases that survive in the corpses of humans, zoonotic diseases from animal corpses must occur in an endemic area for that disease if they are to present any risk. If the area is not endemic for the disease, the probability of corpse-to-human transmission is very low.

There exist two specific situations in which the animal bodies can be a risk for humans: the presence of specific infectious agents and the contamination of water by

¹³ Harvey P, Baghri S, Reed B. *Emergency sanitation: assessment and programme design*. Water, Engineering and Development Centre, Loughborough University; 2002.

feces and discharge from lesions. The microorganisms of greatest concern are *Cryptosporidium*, *Campylobacter*, and *Lysteria*, but only when the bodies are in the water. These microorganisms do not survive for long if the animal is on dry land.

Although animal corpses pose a minimal health risk, the proper disposal of animal remains is important after the initial response to the disaster. The procedures recommended for animal corpse disposal are fairly standard, but we will analyze protocols for two types of situations. The first was developed in order to handle the animal remains after Hurricane Floyd, and the second was designed at the University of Virginia in order to be used in a variety of natural disasters.

In the United States, the Department of Health and Human Services for North Carolina (DHHSNC) issued a set of guidelines for the disposal of animal remains as a consequence of Hurricane Floyd.¹⁴ They recommended that corpses be moved with either a shovel or gloves in order to avoid the potential transmission of infectious diseases. Pets and wild animals were to be buried in holes at least 3 feet deep. In some cases the DHHSNC designated specific dumpsters for depositing corpses. Livestock animals were to be disposed of by incineration. The DHHSNC emphasized that due to the low risk of transmission of infectious diseases from animal corpses, personnel should prioritize care of the living above the disposal of animal corpses.

The Office of Health and Environmental Safety of the University of Virginia (OEHS) developed protocols for the disposal of animals deliberately infected for research purposes and animal corpses resulting from natural death or disasters.¹⁵ For our purposes we will examine the protocols for animals that have died naturally or from injuries. The OEHS recommends disposal of animal bodies in duly sealed, thick plastic bags; subsequently these should be taken to the area designated for final disposal, which might include incineration. Ashes are buried or deposited in a secured landfill.

It is important to note that standard methods of animal disposal vary from country to country, always taking into account the infrastructure and available manpower as determining factors. In general, it is difficult to bury or cremate large animal corpses (entire bodies) due to the great investment of resources. Initially they are sprayed with oil and then covered with soil to protect them from predators until they can be destroyed or buried. The same approach is used when parts of animals or large numbers of smaller animals are found. Another recommendation is to use quicklime, thus delaying the onset of putrefaction and diminishing the numbers of bacteria that might pose a risk for zoonoses.

Other practical advice for the final disposal of animal corpses is offered by Eduardo Fuhrer Jiménez¹⁶ and presented below:

“Certain experiences have shown us that before covering a corpse with dirt, it is helpful to place of layer of blackberry branches or some other thorny

¹⁴ Bruton HD. “State health official recommendations for disposal of dead animals in Floyd’s aftermath.” North Carolina Department of Health and Human Services, 7/29/03. The document can be viewed at the NCDHHS web site: www.dhhs.state.nc.us/pressrel/9-22-99a.htm.

¹⁵ Office of Environmental Health and Safety, “Waste management decision tree,” 7/29/03. This protocol can be viewed at: www.keats.admin.Virginia.edu/tree/home.html.

¹⁶ Eduardo Furher Jiménez, veterinarian with the Servicio Agrícola y Ganadero del Ministerio de Agricultura de Chile (Agriculture and Livestock Service of the Ministry of Agriculture of Chile), personal communication.

plant over the corpse followed by the soil. In this way, dogs, foxes, or other canines that dig to find the corpse are hurt by the thorns, and discouraged from digging.

“When there are corpses of herbivores that have a large amount of grass in their stomachs (they have four stomachs), putrefaction will set in, and gases will swell the body causing the level of the soil covering the animal to rise. It is advisable to break the stomach with a blow to allow the gas to escape.

“Another aspect has to do with incineration of dead bodies. Although on some occasions it is advisable to burn them, when there are a large number of bodies, especially large animals (herbivores), there are negative results. The bodies have been sprayed with oil, and there is an impressive flame that lasts only a couple of minutes. The hair burns and the bodies remain intact. Another negative result is that if someone wants to bury the remains later, it is more difficult to move them without a backhoe, since they easily fall apart.”

Final disposal requires burying the dead animals in pits that are 3 feet deep, and covering them with soil in a site where there is no possibility of contaminating surface or ground water. This should be sufficient in most situations, but should be reviewed in the case of flooding when it is more appropriate to bag the corpses until they can be cremated or buried.

Dr. Eduardo Fuhrer also reported on the management of dead animal bodies after the foot-and-mouth disease outbreak in Chile in 1984:

“In 1984, an outbreak of foot-and-mouth disease occurred and 8,000 animals had to be sacrificed. It occurred in the middle of autumn and in the high mountain range; the snows start in May in that area. In many places there were no roads on which to move the equipment needed to make graves. There remained a series of herds of animals that had not been buried in approximately seven sections, with an average of some 200 cattle (the majority over 250 kg), and 300 sheep and goats (weighing about 30 kg) in each section.

“The site was fenced and people could not access the area, but there were cases of dogs and foxes eating the remains. During the months of May, June, and July the remains stayed under the snow. In August, when the snow melted, the action of the sun and water caused decomposition of the corpses. By the end of October, people were hired to dig pits with shovels using proper standards for hygiene and personal protection. The remains were dragged to the burial area using horses. Negative aspects of this process were the presence of foul odors and the fact that bodies were easily dismembered when dragged by the horses.”

As can be observed by this account, no health problems arose at any time during the process. Since the virus causing foot-and-mouth does not continue to multiply, but remains in the bone marrow, the only problem presented was that of decomposition.

As a final analysis, we can state that the dead bodies of animals represent little or no threat for public health. A series of coexisting factors must be present for the animal bodies to constitute a risk for humans. First, the animal should be infected with a disease that can be transmitted to humans. Second, the germ should be able to survive the death of the host. Third, the environment should facilitate the spread of the infectious agent (for example, contaminated water). Any interruption in this chain of events results in there being a minimal public health hazard. Moreover, the presence of corpses of animals alone cannot be associated with the spread of infectious diseases. The preponderance of evidence demands that the final disposal of dead animals be deferred in favor of attending to the living.

CONCLUSIONS

The available evidence indicates that the presence of human and animal corpses represents little to no public health hazard.

The scientific evidence derived from the examination of diseases that may pose a public health threat in the presence of dead bodies suggests that a very specific set of criteria must be met. These include: that the bodies are hosts of a disease present in endemic areas; that the microorganisms can live on in the corpse or in the environment after the death of the host; and that the necessary environmental conditions exist (for example, degraded infrastructure for waste disposal, overcrowding, etc.).

The presence of dead bodies that result from a disaster, without the presence of another risk factor, is not the cause for the spread of infectious diseases. The criteria outlined above must be concurrent for the body to become a hazard for public health. The removal of any one of them results in a significant reduction of those risks.

The same postulate regarding the public health threat posed by human corpses applies to animal corpses. Furthermore, the same set of criteria for disease transmission by animal corpses corresponds to the criteria that apply to human corpses. Animal corpses pose very limited public health risk to humans, except under very specific conditions.

The authorities and public health professionals face the difficult task of trying to persuade a skeptical population of the limited threat posed by human and animal bodies. At any rate, based on scientific observation, the authorities should understand their critical role in ameliorating the effects of a disaster.

The limited role that human and animal corpses play in the spread of diseases requires authorities to change their prioritization strategies, and better educate the public about the risks posed by dead bodies. Policy, in the absence of mitigating factors mentioned above, must prioritize attending to the survivors above disposal of the dead, taking into account the key issue of the correct use of resources.

Our relationship to the environment is an important aspect of the fear that exists in the general population, and even among many authorities, concerning the probable negative effects that human and animal corpses have on nature. In this regard, it is necessary to insist that there is no risk that dead bodies resulting from natural dis-

aster will spread infectious disease. It should be pointed out that corpses found in bodies of water could contaminate it with fecal matter or with diseases that are endemic in that area.

Disposal of animal bodies involves special processes in accordance with their number and size. Generally disposal of large animals (cattle or horses) is difficult. A temporary, initial measure is to spray them with oil and cover them with dirt until the necessary conditions for final burial exist. Moreover, it is important not to neglect the surviving animals, which should be brought together, cared for, and monitored in order to prevent any outbreak of disease. Since vectors can transmit endemic diseases, necessary steps to control and eradicate them should be taken.

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CHAPTER 4: SOCIOCULTURAL ASPECTS*

Whether dealing with violent deaths in major disasters or in armed conflict, issues concerning the socio-cultural order of a community are valid. The inability to perform rituals condemns a family to a second death: the symbolic death of their loved one for the lack of a tomb that perpetuates his or her name and confers social worth to the deceased and his or her inclusion in the generational continuity of a family.

INTRODUCTION

The human being is united in social groups by a variety of bonds, which means that his or her death, outside of the biological event, has profound implications. This chapter addresses the implications related to socio-cultural aspects of communities that support the recommendation made by the Pan American Health Organization, and that governments and authorities should be aware of, to avoid taking incorrect decisions about the disposition of bodies in critical moments such as disasters with massive fatalities.

Death is a transcendent event for any social group. The beliefs with respect to an afterlife, relationships between the living and the dead, the desire to offer respect and honor the deceased, the mystery and the fear that surround the unknown, the change in routine, and the grief inherent in the death of a human being shape the funeral customs characteristic of a culture.

The disappearance or loss of a loved one is followed by an emotional, physical, and subjective reaction, known as grief. Grief is an objective state of deprivation, of being stripped of everything. It is a complex and changeable phenomenon involving many factors. Disposal of the dead body in human society is surrounded by ritual acts performed around the body, funerals, and general commemorative rituals that benefit stages of the grieving process.

Although the funeral is only a small part of this process, it is essential because of its public nature. It is through public ritual that society accepts and pays attention to the grieving process.¹ Public rituals around death strengthen the social bonds with the hope of shared survival. Such acts fight off death through continuity of the social group: funerals give the members of society the impression that death is culturally

* This chapter was prepared by National Institute of Legal Medicine and Forensic Sciences, Forensic Thanatology Division, Bogotá, D.C., Colombia.

1 Irion, Paul E. "The funeral and the bereaved." In: C. Allen Haney, Christina Leimer, Julian Lowery, *Spontaneous memorials: violent death and emerging mourning ritual*. <http://www.adec.org/pubs/omega.htm>.

controlled and regulated;² they help society confront the death of its members and mend the trauma of loss.

Rituals also have a personal and private impact on the mourners: they provide an opportunity to express their loss in a prescribed way and to accept the reality of their loss, which requires disposing of the presence of the body.

When isolated deaths occur within the normal context of social development, the relatives and social groups comply with funeral rituals without hesitation, in the manner proscribed by local customs. However, when a catastrophic event occurs with many deaths, whether caused by natural phenomena or by human activity, social groups are unable to act “naturally” or “as usual.”

When tens or hundreds of corpses are present, such intense social pressure results that there is a tendency to make decisions that neglect the needs of the group and individual to conduct proper funeral rituals. This has a significant impact on the mourning process. The effects of disrupting normal rituals and the unresolved mourning of a society are thought to be decisive factors in the recurrence of episodic outbreaks of violence. The map of violence in the world shows similar antecedents throughout history, although they may be attributed to a variety of causes at different times.

Currently, the levels of proficiency in the scientific study of death and in the development of technology provide alternatives in managing mass fatalities in disasters. It is possible for survivors of major disasters to recover the bodies and to proceed with the rituals that will help them confront and resolve their grief, both privately and collectively.

THE FUNERAL RITE

Society is a system of relations built between individuals who are bound by sympathy and utility, whose life together is regulated by customs and norms. Death is the most powerful and mysterious of the changes that affect the cycle of human life, it is a hazard that has the power to destroy family structure and break the ties of a community. The death of the human organism, a biological phenomenon, does not involve the disappearance of the affective ties and interrelationships—of all sorts—of the deceased with the members of the social group. Thus, to the extent that human beings have developed their capacity to conceptualize, they construct and live in a mental reality in which their relations to the deceased persist, dynamic and unchanged, until mourning is appropriately carried out.

The origin of worship of the dead is intimately tied with the very birth of civilization and is closely related with it: the desire to keep and perpetuate absent people and things compelled humans initially to create pictorial and sound representations, and later to develop words. These words permitted and permit humankind to address conceptual aspects of the world. Thus, the idea of “another life” or “the beyond,” is

² Bauman Z. Mortality, Immortality and Other Life Strategies, Cambridge: Polity Press, 1992. Cited in Jon Davies, War Memorials, in: Clark C (ed), The Sociology of Death: Theory, Culture, Practice, Oxford: Blackwell Publishers for the Sociological Review, 1993, 15. Available at: www.uea.ac.uk/~j024/unsoc/beingdead.pdf.

conceived as an invisible world, inhabited by the souls of the dead and by gods and demons, as manifest in the power of nature. The “beyond” is related to the appearance of religion (from the Latin *religare*, “to bring together”) that serves as the basis for social bonds.

Rituals involve the symbolic use of body movements and gestures to express and articulate meanings about a social situation. They are used to structure the society, initiate people into a community, guide human behavior, give significance to important aspects of life, commemorate transitions, and connect emotion and reason through a physical act. The rituals are pillars of social organization and provide for communication whose function it is to maintain control of events that, otherwise, could cause serious disruptions in the social performance of the group.

Rituals often have religious meaning but this is not an intrinsic feature. The aspect that defines them is that they comprise more or less fixed, invariable sequences of formal acts and utterances that are not entirely defined by the practitioners. When responses to crisis are ritualized through these traditional, conventional, and relatively long-lasting customs, the sensation of familiarity contributes to a feeling of comfort and of control of the situation.

It is believed that ritual begins as a spontaneous response to a given situation in order to meet the needs that people cannot express.³ This is why rituals are so important in crisis situations in which the question of meaning initially stems from emotional more than rational factors.

The funeral belongs to the group of the so-called “rites of passage,” a term coined by the Dutch anthropologist Arnold van Gennep,⁴ that facilitate the important transitions in human life. Three phases of passage from one stage to another are described: separation, marginalization, and reincorporation. In separation there is ritualized removal of the individual from society. This is followed by a period of transition during which the individual is marginalized and is the most uncertain of the stages for the persons undergoing the transition. They do not have a clearly defined role, their position is vague and indeterminate, and they are in a state of limbo with respect to their normal social role. This phase ceases with reincorporation, when the individual is accepted back into society with his or her new status.

The threat that death poses for society can be seen through the funeral as a rite of passage of two kinds. For the deceased it is the transition between life and death, which is conceived as heaven, a spiritual world or another life. The survivors perform the ceremonies and their social status and identity are related with that of the deceased person. The survivors abandon some roles and lose some status as a result of the death, but they also assume new roles.

The funeral ritual has the greatest emphasis on the liminal period—from the Latin *limen* or threshold—the term used to describe transitions characteristic of the rites of passage. When passage through this threshold is interrupted, the assumption of socially important roles is altered, causing damage to the social framework. It may

³ Irion, Paul E. *The funeral and the bereaved*. In: C. Allen Haney, Christina Leimer, Juliann Lowery, *Spontaneous memorials: violent death and emerging mourning ritual*. <http://www.adec.org/pubs/omega.htm>.

⁴ Van Gennep, Arnold. *The rites of passage*. Chicago: University of Chicago Press, 1960; Cited by C. Bourchier (Ref. 18). Available at: grad.usask.ca/gateway/archive13.html.

take several generations to evaluate the magnitude of this damage, because its effects are not immediately seen.

In short, funeral rites serve to redistribute the roles of the deceased among the survivors, adjusting the social roles of those who remain in order to ensure the continuity of the group. In the initial phase of mourning the funeral rite serves as a means of social control by establishing a pattern of behavior that assists the survivors to keep their emotions in check, to reduce their anxiety so that they can manage a new situation, and, in the long term, to be rewarded with new status and new roles that are publicly acknowledged. If we take into account that, in addition to all of this, it affirms to the mourner that they will be accepted once again into the world of the living, and that their isolated condition is not permanent, we have a glimpse of the inevitable upheaval caused by the omission of this ritual.

Changes in funeral rites through history

The funeral rite has changed throughout history, from abandonment of the body in the natural environment in prehistoric times, through burial in common graves, up to the funerals we usually practice in Western society today. Initially, the dead were buried near their homes; cemeteries do not appear in cities until the seventeenth century. In the Middle Ages, the dead were left with their faces uncovered and, with the exception of aristocrats and clergy, were buried in common graves which remained open which allowed the deposit of other bodies. Subsequently, it was popular to prepare death masks that were exhibited in the home or in the church where a vigil took place. Attempts at preserving the identity of the deceased can be seen through these customs, but it was not until the twentieth century that the idea of emphasizing the name and identity of the deceased took hold.

Philippe Ariès, the modern French historian, in his excellent book *The Hour of Our Death*,⁵, examines the evolution of cultural perceptions about death in Western societies, their relation to funeral rites, and their impact on the life of the community. He recounts that the social perception of death has gone through stages that reflect the culture as it is lived in each epoch. For example, in medieval Christian culture, death was considered a collective destiny, ordinary, unavoidable, and not especially frightening; it was confronted with resignation and a mystical faith. In view of the fact that many deaths were natural and expected, a ritual was strengthened that, in the romantic era, progressively gave more importance to feelings of grief and its manifestations. This situation changed with the great world wars when the perception of a “natural order,” whereby the parents die first and then the children, gives way to the so-called “inverted death,” and it is the parents who bury the children.

It is said that this situation influenced perceptions about death in the twentieth century. A radical change in the traditional ideas about death has occurred, a change in which death no longer plays a central role in daily life and its importance is minimized in the public sphere. The subject of death has been eliminated; it is somewhat painful, prohibited, and even disgraceful; it is a subject that is embarrassing; there is

⁵ Ariès, Philippe. *The hour of our death. A landmark history of western man's changing attitudes toward death – and thus his perceptions of life itself – over the last thousand years*. Alfred A. Knopf, New York, 1981.

the expectation that it be treated with discretion, and not discussed in public. The reasoning is that death should be tolerable for the survivors, unaccompanied by strong or noisy emotions that annoy the society. Ariés calls it “invisible death” and relates it to the need for the social machinery to replace the soldier fallen at the front by another, as one game piece replaces another.

Changes in funeral rituals over time are slow, usually taking place over several generations, and when they do appear it is between long periods of calm,⁶ when established customs can facilitate change. The omission of a community’s own rituals due to the haste caused by the pressures inherent in a disaster and because of the difficulty of carrying out rituals, presents a situation of extreme pain for the community that parallels the “invisible death” described for situations of war.

Influence of culture, religion, and history on funeral rites

Another factor regarding rites and commemorations is that they reflect, at a given time, contemporary society and the traditional customs from which they originated. The changes in rituals are imperceptible over the course of one or even several generations, as we have just seen. The traditional component of ritual gives significance to death *within a culture*, thus helping to heal and strengthen so that life can go forward in a very complex and changing world. On the contrary, an interruption in the observance of the rite reveals that major historical changes are in progress. Let us briefly look at some examples that manifest cultural and historical differences in this area.

According to the customs of the indigenous Wari population in Brazil, who practice endocannibalism, close family members eat the body or, if it is decomposed, they burn it in order to avoid putting it into a cold grave. They view burial with as much horror as cannibalism is viewed by those who do not practice it. Despite how strange and alien this practice may seem to our culture, it is noteworthy that both of these rites prescribe special treatment for a body that neither appreciates nor benefits from the efforts of its fellow humans.

Let us contrast this historically with what occurred in the Andean region during the Spanish conquest. This was a time of catastrophic displacement of the indigenous peoples, who formed the “vanquished” group. This was followed by a period of acculturation, of collaboration with the Spanish, and of assimilation into the dominant system, and their own society and the culture were destroyed.⁷ The indigenous people were forced to assimilate Christianity, the religious expression of those who dominated them, and they attempted to comprehend their new situation which was created by the traumatic experience of submission.

Rituals in the indigenous cultures that occupied Latin America before the Spanish conquest played a supporting role and were a point of reference for those people, to

⁶ Ariès, , op. cit. pg. xvi, preface.

⁷ Riveros E., María Elena. *Religión e identidad en el pueblo Mapuche*; presented at the seminar on "Problems of Latin American Culture," Prof. Grinor Rojo. Available at www.uchile.cl/facultades/filosofia/publicaciones/cyber/Cyber5/textos/riveros.html.

the extent that colonizers considered that their destruction was essential for progress. The Franciscans who colonized Central America beginning in 1523 described it: "We burn everything ceremonial and suspicious."⁸

Today, ancestral customs are only observed in the few tribes that still subsist as communities and continue to keep their traditions, although many have not managed to escape from outside influence. Respect for deeply rooted local traditions gains increasing importance in communities that are on the verge of disappearing.

Due to the historical importance of these cultures, we present a brief account of some of them here. They have been extensively documented in anthropology and history reports about funeral rituals and customs in which death, the soul, and its passage to the afterworld were represented in rites of passage.

The Incas, a name used by the rulers of the ancient Peruvian empire and by extension applied to the peoples who formed this empire and to the civilization that developed, had funeral rites that were particularly solemn. The corpse had to remain intact since the soul remained for some time near the body, and later followed its destiny. For the Sapa Inca (the supreme ruler) destiny was the sun itself; for noblemen it was the heavens or upper world, where they were free from all evil; for all others it was a world that was equally miserable as the one they inhabited before death. It was also believed that the souls of village people returned in animal bodies. The body of the Sapa Inca was seated in a golden chair that was placed in a chamber, and his women were buried alive in another chamber. After some time had passed they were embalmed and the mummy of the Inca was transferred to Coricancha or the Temple of the Sun.

In Aztec culture,⁹ for the deceased who were destined to go to Mictlán (the underworld) it was common to place the corpse in a crouched position, wrapping it in a shroud and tying it tightly. Before burning the mortuary bundle, a small stone was put in the mouth of the corpse (jade, in the case of the aristocracy). That stone symbolized the heart and was placed in the mouth so that it could be left as a jewel in the seventh region of the underworld, where it was thought that wild beasts devoured the human heart. They put a jar with water among the shrouds that had to serve for the journey. The spirit had to face extreme cold in one of the distant regions, where the wind was so violent that it cut like a knife. The deceased's jewels and adornments were burned in a fire to help overcome the cold.

The heavy shroud would be used for the spirit to pass another test: the passage between two mountains that would fall to block the route. The deceased received objects of value that could be offered up to Mictlantecuhtli, the lord of the dead, or to his wife, Mictecacíhuatl, when the last stage of the difficult journey was completed. Besides the magic formulas and advice to the

⁸ Bautista Pomar J. Relación de Texcoco, México, Díaz de León, 1981; Cited by Gruzinski S, La red desgarrada en la colonización de lo imaginario, Mexico: Fondo de Cultura Económica de México, 1995. Second printing. Page 23. Available at www.todohistoria.com/informes/aztecascultomuerte.htm.

⁹ Ibid.

deceased about the correct path to reach the afterworld, it was the responsibility of the elderly to direct the funeral ceremonies, from ritual shrouding to the incineration of the corpse and burial of the ashes.

After the incineration, which was carried out while chanting songs, the elderly sprayed the human remains with water, placed them in an urn, and buried them in rooms of the house, including the small stone that had been placed in the mouth of the corpse. Miscellaneous offerings were included, along with the indispensable dog that would have to help its master in the journey beyond the grave.

According to the indigenous informants of the missionary Bernardino Sahagún, it was customary to put daily offerings where the bones of the dead were buried. The ashes and bones of the noblemen were not buried in just any room, but in a sacred place, usually close to a temple. The ritual apparatus in those cases was much more complicated and involved the deaths of numerous slaves.

There were very unique features in the funerals and burials of women who died in childbirth. After multiple washings, the body of the Mocihuaquetzqui (brave woman) was dressed in her finest clothing and at sunset, the hour of burial, the husband took the body to the courtyard of the temple devoted to the Cihuateteo (celestial princesses), where she would be buried. The relatives and friends of the dead woman formed the funeral retinue, all armed "with shields and swords and crying out as if urging soldiers into battle." Such posturing, besides being ritualized, had a practical function: they had to defend themselves against young warriors who would raid the entourage to seize the corpse, and cut off the central finger of the left hand and the hair, items to which they attributed magical powers that would give them bravery in battle and inspire fear in their enemies. Bandits also tried to seize the corpse for similar reasons in order to cut off the left arm. So the husband and other relatives of the deceased kept watch over the burial site for four nights.

In contrast with the Aztec or the Incas, who dominated vast areas, several independent Colombian cultures occupied relatively small areas in the Andean region and along the Pacific and Atlantic coasts. They reached various levels of development and although they shared many features, they were very different in other aspects. Among the most significant were the Tayrona, Sinú, Muisca, Quimbaya, Toliroa, Calima, Tierradentro, San Agustín, Nariño, and Tumaco cultures.

Tierradentro and San Agustín flourished long before the Spanish conquest, while other cultures were supposedly at the apex of their cultural and social development when the Spanish arrived. San Agustín is one of the most extraordinary ceremonial centers in South America, notable for hundreds of monolithic statues and graves spread over a very broad area.

There, the primary burial included the construction of a tomb, small cylindrical pits where the flexed body barely fit, within which objects of the owner and food were placed for the passage to a new life. The second part of the ritual involved transferring the remains, by that time dry bone, to larger tombs

known as hypogea, which served for the collective burial of a human group, divided by social status. There, the remains of prominent tribe members were placed in serial underground burial chambers that were laboriously dug into the soft rock and decorated with painting on the walls and ceiling.

Currently in Colombia, most indigenous groups are not homogeneous and experience the same conflicts and characteristics as any other human community, with economic, ideological, political, and religious differences, etc. Within the same indigenous population we find Catholics and Protestants, as well as groups that do not practice either of these faiths. A large percentage of the indigenous population is undergoing “peasantization,” which is reflected in the lack of homogeneity of their rituals.

A major disaster can have a concrete affect on an indigenous group, in which case it is a priority to consider the most viable ritual in accordance with the living beliefs within a community, and which takes into account specific ethnological and cultural characteristics.

On 6 June 1994, an earthquake caused landslides resulting in extensive flooding of the Paéz River basin in the Cauca Department of Colombia.¹⁰ In municipalities that were declared disaster areas there is a concentration of indigenous Paez and Guambiano peoples. The human losses, including the dead and missing, were nearly 1,100 people. The earthquake caused dispersion of families, loss of relatives and friends, fragmentation of communities, and loss of farmland, houses, crops, animals, and other properties. The entire membership of the Wila council disappeared in the landslide, forcing the community to select new leaders in the midst of the emergency. During the days following the earthquake, it was a priority for both indigenous organizations and the State to reunite scattered families in the area affected by the disaster. In a variety of sources consulted, we have not found specific mention of funeral rituals related to this sad occasion.

In Catholic theology there are numerous allusions to physical death, to its eschatological significance, to the observance of ritual, and care of the grave. These types of judgments establish a frame of reference that is interpreted in different ways depending on attachment to a particular cult.

This is illustrated in Ecclesiasticus (Ch. 38 v.16-17): “My son, shed tears over the dead, and begin to lament as if thou hadst suffered some great harm, and according to judgment cover his body, and neglect not his burial. And for fear of being ill spoken of weep bitterly for a day, and then comfort thyself in thy sadness.”

¹⁰ Wilches-Chaux G. “Particularidades de un desastre - características del terremoto y la avalancha del 6 de junio de 1994 y de sus efectos sobre las comunidades afectadas.” Corporación NASA KIWE, 27 June 1995. Available at: www.nasakiwe.gov.co/quepaso.php.

The book of Job (Ch.19, v. 25) makes allusion to the belief that on judgment day the souls will recover their bodies: "...I know that my redeemer lives and that he shall stand at the latter day upon the earth; and though after my skin worms destroy this body, yet in my flesh shall I see God."

In the following discussion, our references to the Catholic religion are based on rituals used in Colombia, a country with a Catholic majority, and which can be extrapolated to other Latin American countries.

Catholics place great value on a "dignified" burial, which includes a religious ceremony, coffin (the best possible), and burial in a cemetery. Such importance is placed on this ceremony that, in many cases, neighbors and associates contribute money as an expression of solidarity to defray the costs.

A vigil is carried out which involves accompanying the corpse before burial either at home or at a funeral establishment. The purpose of the vigil is to make the difficult time after death more bearable, and since the body is exposed in the coffin it allows people to see it for the last time. The body is prepared or embalmed to delay decomposition and to make it appear "as if it were alive" during the funeral rites. During these ceremonies prayers alluding to "eternal rest" or "perpetual shining light" express the wishes of the mourners for the departed soul. With the exception of some groups, it is customary to send floral wreaths or bouquets with the name of the sender written on a wide purple or white sash.

The family members and associates of the deceased attend both the vigil and burial wearing dark colors to show sympathy for the loss of the loved one. Close family members, especially the widows, parents, and children keep "full mourning" if they dress for a period of time in black; when in "half mourning" clothing and accessories might be black, grey, or white.

During the funeral, the body is taken from the room where the vigil is held and taken to the church for the religious ceremony or funeral rites. Once the mass concludes, a procession of relatives, friends, and associates, led by a hearse, moves slowly to the cemetery in order to accompany the deceased to his/her "last dwelling place." Prayers are made invoking eternal life, and the coffin is placed in a prepared burial vault or a grave.

Cremation is increasingly common but is prohibited for those who die from unnatural causes until it is certified that there is documentation of a thorough examination of the body, that any physical evidence necessary for resolving the case has been preserved, and the deceased has been accurately identified. There is a trend toward replacing traditional cemeteries—considered depressing—by "cemetery parks" with green areas, trees, and gardens. The remains should be exhumed within five years and placed in an ossuary, or cremated and deposited elsewhere, including in the home of the deceased.

The subsequent mourning period includes the gathering of the closest family members and restrictions on recreational and social activities for a time. It is customary to hold special services for nine consecutive days following the death (the novena), and celebrate mass at the end of the first month and the first year after the death.

Mythology surrounding death—*algor mortis* or the cold of death—has been embraced in popular culture with the belief that the cold of the corpse is transferred to susceptible people such as to pregnant women and her fetus. It is also believed that the pale or ashen color of the corpse is acquired by those who, working in mortuaries or morgues, are “anointed by death”; these workplaces, as well as cemeteries, are considered to be mysterious, somber, and dirty. It is believed that a corpse’s decomposition pollutes the environment and poses a health hazard, not only for reasons of hygiene but out of fear of the afterlife. These myths, as we will discuss later, acquire such importance in the imagination of the community that it is possible to understand the decision-making that denies the performance of funeral rites.

For Judaism,¹¹ the *Shuljan Aruj*, a summary of Judaic law, sets the standards and principles of actions that Jews should satisfy for various circumstances of life. There are two central ideas in Judaic law: respect and reverence for the dead and the treatment of the afflicted and relatives. For the first, it is said that the human being has three sources: man, woman, and God; at conception, God transmits a part of his spirit to humans that returns to Him at death. Immediate burial conforms with the first of the tenets of rabbinic law.

The body is the container of the spirit and the spirit originates from God. This concept explains the meticulous care given the corpse (the order and respect in preparing and washing the corpse by specially designated people). The period from the time of death until burial is complete is called *onanut* which could be translated as “grief.” The necessary elements for the funeral rite should be simple and austere since the deceased should be presented before God in all of his or her purity and simplicity. Floral offerings are not made since they are considered a symbol of joy, and the body must be buried before *Shabbat*, or the Jewish day of rest.

The liminal features of mourning are noteworthy: there are specific instructions for the first seven days, the first thirty days, and the first year following death, as a way of marking the isolation and later reintegration of the mourner into the community. They encompass behavior, food that can be eaten, and standards for daily activities and for relationships.

In this context, autopsy violates the principle of respect for the dead and is only authorized when, according to the physician, new knowledge can be gained that would help cure others suffering from the same disease, or when the law requires it. In light of the expectation of resurrection, all of the body parts should be buried together, so in case of autopsy, it is important that loss of blood or tissue during the procedure be avoided, and after having conducted the necessary examinations, any fluids or tissues be buried in their entirety with the corpse.

Cremation has been considered abhorrent since Biblical times, and while not strictly forbidden by Jewish law, it is discouraged. Embalming is prohibited because it violates the principle of respect for the dead; in its place, the body is ritually washed so that it will be as clean and pure as it was when it first arrived in the world. Cremation or embalming can only be authorized in special circumstances such as transfer of the body to another country.

¹¹ Augman, Ricardo Alberto. *Sobre duelos enlutados y duelistas. Muerte y duelo: mirada al judaísmo*. Buenos Aires: Editorial Lumen, 2000. Page 209.

In the United States there are relatively recent rituals, such as cremation, commemorations for the victims of AIDS sewn into a quilt, the wall of the Viet Nam Veterans Memorial,¹² the tomb of the Unknown Soldier, and other monuments to the war dead. These rituals represent the values, beliefs, or lifestyle of the deceased and there is an increasing tendency to personalize the funeral, either placing photographs of the deceased in the room where the vigil takes place, or music enjoyed by the decedent, decorations with a car or favorite toy, and other objects that are incorporated into the gravestone.

Death is considered the most personal and irreversible act, and it is hoped that loved ones are treated and remembered in ways that express respect for their singularity or that reveal a special relationship with the deceased. Relatively recent changes include the trend for those attending the funeral to be more participative rather than passive during the ceremony as a way of emphasizing that the service could not be conducted without their presence. Traditional rites have been modified so that relatives can sing a special song, read a poem written for the occasion, or share a special experience or story related to the decedent.

The ceremony has become more informal owing to the spontaneous participation of those attending and certain practical aspects such as scattering ashes after cremation takes place. As a reflection of the increased mix of cultures, there is a trend toward secular rather than sacred ceremonies.

THE SYMBOLIC VALUE OF THE CORPSE AND BURIAL

It is clear from this brief review that the corpse has a symbolic value of great power for families and communities of every culture and creed. This symbolic value comes from the power that the corpse elicits as a material object, and which is explained by our notion of reality as the image that we have of objects and, in general, of perception through the senses. Culture is built on certain symbolic foundations determined by the close and permanent bond between the object and its representation.

The bond that the members of a family maintain with their dead is of a symbolic and religious nature, which is established through the material objects that remind us of them; this meaning does not exist outside of this evocative power. The grave fulfills the function of intervention and, in addition, as the exercise of a right, which is expressed by constructing a grave, maintaining it, and visiting it. This is similar to the relationship believers have with objects of worship: it is the exercise of the right to conserve the material object which is the depository of symbolic evocation. The State has the duty to guarantee the exercise of this right.¹³

As we have seen, all religions have their own forms of ritual that allow their believers to understand the significance of what cannot be directly experienced. Ritual participation is known as the “right to worship” and the ability to perform all

¹² Leimer, Christina. *Funeral and memorial practices in a new era*. The Tombstone Traveller's Guide. Copyright, 1996-2002.

¹³ Cifuentes, Eduardo. Fallo de la Corte Constitucional Colombiana por acción de tutela (24-III-94). *¿Quién tiene derecho a exhumar un cadáver? El derecho a la inhumación en casos forenses en medicina legal*, vol. 7, pages 5-17.

of those acts, ceremonies, and practices through which we manifest belief in the supernatural or in the importance of the human being as a participant in the succession of generations.

One can deduce from the text above that any act disrupting the exercise of worship is extremely serious for the believer since it cuts off communication with the “other world,” it hinders the faithful in fulfillment of their obligations, and it inhibits the healing aspects of individual and collective mourning.

The importance of worship derives from the importance of religion itself, which is understood as belief in something to which the individual is subordinate and completely dependent. It gives specific meaning to all acts of existence, and establishes bonds among the individuals of the social group.

The importance of worship, as an element that is inseparable from belief, has led to the inclusion of religious worship as a fundamental right in constitutional charters. In this way, protection of freedom is expanded from simple recognition of a belief to the full acceptance of the acts of worship. This also applies to the freedom not to participate in any form of worship and to honor neither the body nor the person at a funeral, but the idealized personification of the objectives of the social group. Burial and exhumation of corpses tend to be regulated by religious authorities, but in the absence of this type of tradition or belief, the care of the corpse, including rights of burial and exhumation, are the responsibility of the State and not a church.

The custom of creating graves has a fundamental and profound significance. An inscription of the name and in some cases a photograph, statue, or epitaph memorializes the deceased. As has been said, the grave functions first as an evocation of the deceased, and second, as a symbol of social stratification due to the tomb’s size, shape, materials, location, etc. Tombs represent families, and the value of the materials in the tomb represents the degree of family esteem for the deceased.

Death is the object of an entire religious elaboration derived from the mystery surrounding the end of life. The corpse serves, then, as the means for mythical re-creation of the deceased and of its new intermediary relationship with a higher being when the soul has had the privilege of salvation. From this standpoint, the idea of building tombs is a response to the personal need for transcendence and perpetuation.

Burial also has undeniable anthropological importance. The human being deals more easily with death when there is certainty that the corpse will rest forever in one site. The disappearance of a person implies enormous suffering when there is no expectation that he or she survives and the dead body is not found. This phenomenon has been well researched in terms of the psychological situation of relatives of the “disappeared.” The inability to overcome grief impedes psychological and social recovery and maintains the family member in a paradoxical state of unbearable hope. The certainty, even in extreme situations, of knowing that a loved one is dead provides a measure of tranquility: to bury the dead is also a symbolic act by which humans recognize their temporal condition and surrender to the changing fortunes of life.¹⁴

The three ideas mentioned above: social differentiation, religious belief, and anthropological characteristics, can present simultaneously or separately. In any case,

religious belief is the greatest bond that an individual has with symbolic power since it is directly related to the practice of worship which is protected as a fundamental, and immediately applicable right.

MOURNING AND RITUALS IN DISASTER SITUATIONS

We have discussed in general terms the foundations for the practice of funeral rites and the need to complete the stage of mourning as a period of transition after the death of a loved one. Moreover, we saw how every culture and social group expresses themselves through specific customs that require a certain period of time to complete. These customs are so deeply rooted that they are unavoidable and difficult to replace when it is not possible to perform them in the traditional manner. Without exception, these rites emphasize and remember the identity of the deceased. While critical, in major disasters with massive fatalities these rites are sometimes not given the highest priority and are often postponed or even omitted.

The experience of violent death in armed conflict, for example, sheds light on the importance of identity. Although identifying the dead body might be feasible through traditional methods, relatives sometimes choose not to claim a body to give it a proper burial out of fear of being associated with the deceased and subject to reprisal from the authorities.

In these circumstances and when a name is not provided, the corpse is buried without any identification by the State. Various studies reveal the difficulties of mourning in cases where someone has disappeared, a situation that is aggravated when there is the possibility of political homicide or other suspicious circumstances. Thoughts about the suffering and pain inflicted on the loved one cannot be verified or discarded when the identified corpse is not available. When rituals cannot be conducted the family is sentenced to a second death, the symbolic death of their loved one, and this for the lack of a tomb that perpetuates his or her name and confers social worth to the deceased and his or her inclusion in the generational continuity of a family.¹⁵

Whether regarding violent deaths in major disasters or in armed conflict, all of the above referenced socio-cultural considerations about the right to ritual and to mourning on the part of family members remain valid. To give in to the pressures that everyone experiences, and that one sometimes shares, translates in the medium- or long-term into a variety of sequelae that will seriously affect the social group. If the right to identity is not preserved for the dead, legal, financial, and emotional consequences will have a serious effect on family members, as well as the community at large. In major tragedies, the person who mourns often does not even know the victims but feels the need to participate in the ritual, as illustrated in cases such as the bombing of the Murrah Federal Building in Oklahoma City in 1995.

The lack of identity of the dead also implies that family members cannot bury the body according to valued rituals, or to cry for their loss in order to move ahead with the closure that comes from honoring the corpse. The missing person is remembered

¹⁵ Ibid.

as if he or she were still alive; there is no definite confirmation of the events surrounding the death, leaving a void that causes painful and unending speculation. No less important is the need for the death to be certified so that family members can proceed with inheritance and civil procedures.

Current technology makes it possible to identify decomposed or fragmented corpses with a very high degree of certainty so that families can confirm the death of a relative and discard the belief that because the body has not been seen, there is a chance that “he/she is still alive.” Technology confronts the person who is grasping at the hope that someone has survived (because “not seeing is not believing”) with reality. It also has increased expectations about death investigation and the exposure and punishment of crimes since reliable identification of the victims and investigation of physical evidence at a crime scene make it possible to pursue legal charges against those responsible. This also applies to intelligence work which is of special importance in prosecuting terrorist acts.

We can not overemphasize that, despite the first and spontaneous decisions taken in emotionally charged situations, it is essential when processing a case to take the time needed to respond to the psychosocial needs of the people and communities that suffer from a disaster or an event with mass fatalities, with the aim of satisfying basic physical and security requirements. Only through proper management of an event can we reduce the emotional burden of the losses and stimulate social recovery.

Before making any decision regarding the final disposal of the bodies of those killed as a result of major disasters, the current thinking of a society with respect to the deaths and their need to conduct funeral ceremonies or rites should be taken into account.

Mourning the loss of loved ones can easily be extended to animals since humans, especially in old age and in childhood, maintain important bonds with and affection for their pets. In many instances affection for an animal is as strong as for other humans. The loss of animals also represents important cultural and economic repercussions experienced by disaster victims.

We recall here the flood disaster that hit an indigenous population in Murindó, Colombia, in 1992. The greatest concern of the disaster victims was the loss of their animals because they provided sustenance for their families.

When planning assistance for a population after a disaster, the emotional bonds and interdependence that tie people to animals, whether pets, livestock, or simply species with which humans coexist need to be taken into account.

UNRESOLVED GRIEF

Currently there is a better understanding of the importance of the perception of death, individual and collective grief caused by death, and the rituals through which emotions are modulated. The long-term impact that these three elements have on the

development of a strong and harmonious social fabric is difficult to perceive for those dealing with response to a critical situation where there are many deaths, and generally in circumstances where there are major impacts on the public.

Although funerals are usually valued for their personal, religious, and social meaning, they also contribute to potential cohesion or political strife. The symbolic reaffirmation and reconstruction of social hierarchy after the death of an authority or political leader is the most common example of political aspects of a funeral. Rituals surrounding the death of common people were also the genesis of profound social change, as, for example, the revolt of slaves in North America who were denied the practice of ancestral rituals to honor the memory of their dead. It is evident that if the respect shown to the dead helps to define the respect owed to the living, the forms of ritual are an expression of society and its values.¹⁶

Accepting a death that occurs as a result of a natural phenomenon is inescapable, and the causes are beyond human control. Grief in these situations is attended by resignation. In contrast, violent deaths resulting from the abuse of power initiate very complex personal processes that have social impacts which are not well understood. We can approach this subject by recalling the importance of the Roman games in which the community, organized as the State, created and demonstrated, through the sacrifice of the gladiators, its power over death and thus reaffirmed the social order and its capacity to face a variety of external threats.¹⁷ Similarly, the power to properly perform funeral rituals in the case of violent deaths that require legal investigation helps to restore society's confidence in its own institutions.

For this reason, violent deaths, which generally affect young people, deserve special consideration. In the long term, social control in situations of this nature is chaotic for the community owing to the difficulty of giving meaning to such deaths and, as mentioned elsewhere, because it is often impossible to conduct appropriate funeral rituals during the conflict situations that exist in many countries.

The unresolved grief associated with disappearance or traumatic death of loved ones can be found in the genesis of new deaths that generate new mourning with a series of problems and questions from the mourners. The progression of these incidents helps to explain why programs for conflict resolution attempted in each country have such poor results. This vicious cycle prevents healthy mourning and inhibits the community's ability to return to the important matters of life.

When the complex cultural features that surround funeral rituals and their meaning for the social group are ignored in a major disaster situation, the community seeks alternate ways to express their grief; these are not always fruitful, inevitably are more difficult, and have far-reaching and unpredictable repercussions.

¹⁶ Burrell D, Andrien K. "Death and slavery: reading slave funerals as sites of political contestation." History 700: Seminar in World History, 22 December 1997. <http://dave.burrell.net/slave.html>.

¹⁷ Grant, Michael. Gladiators (1967). Wiedemann, Thomas: "Emperors and gladiators" (1992). Hopkins, Keith. "Murderous games," in *Death and renewal: sociological studies in Roman history* (1983). http://itsa.ucsf.edu/~snlrc/encyclopaedia_romana/gladiators/gladiators.html.

ARGUMENTS FOR THE RAPID DISPOSAL OF CORPSES

Those who have to make decisions about disposal of a large number of the bodies of those killed simultaneously or over a brief period of time, are not always aware of the considerations outlined in the above text and, even if they are aware of them, they are suddenly subject to such pressure that they tend to disregard such concerns. Various justifications are used, ranging from the mythical, to the “scientific,” and to State authority, all of which neglect psychological aspects, forgetting that these are primordial and closely linked to human nature.

Using public health arguments, priority is given to “solving” the biological decomposition of bodies which are thought to be environmental contaminants. With short-sighted urgency, the response is to use common graves to quickly and indiscriminately bury the bodies without identifying them, rather than individualizing them in a way that would make it possible either at the time of the event or *a posteriori* to establish their identities and clarify the circumstances of their death.

Fire is considered to be purifying (as was believed in Celtic and other cultures). Using this criterion, the extreme measure of incineration is resorted to in situations of mass fatalities. This is often ineffective and very expensive considering the required fuel and the fact that it will take place in the open. In addition, incineration prevents both the investigation of the event and the possibility of ever returning the bodies to their relatives.

The notion of filth and disease transmitted by dead bodies is a deep-rooted myth that is culturally defended, at least in part, by the social project of public health. This is based on hypotheses about hygiene which, diluted and fragmented, were introduced into the culture and community action and originated in the development of industrialization and the scientific paradigm, which crystallized during the nineteenth century in the west.

Thus, references that are known by the public, such as “bacterial proliferation,” are in keeping with the fear, for example, of possible water pollution following massive fatalities. This results in a variety of explanations and strategies that fluctuate between the scientific and the preposterous, the popular and personal, the useful and the convenient in light of what is dubious and where there are conceptual gaps. In the previous context, the corpse is seen as the depository of maximum possible filth and its contaminating potential is used as justification to obtain a rapid burial.

An example of this, provided by the Pan American Health Organization, describes how, despite rational knowledge, unfounded notions prevail:

“After a landslide, the recovered corpses were being placed in the street. The president of the country arrived with his personal physician who, upon viewing the scene, ‘counseled’ the president to immediately have the area fumigated in order to prevent the spread of disease. Even though the public health professionals who were present knew that fumigation was pointless, they could not go against the order.”

We see the historical burden that combines ecological concerns with the symbolic, in an attempt to isolate the dead and death to a limited space both symbolically and in its physical contact with individuals (living and healthy). The effects of death can be discerned, but not the manner in which the death occurred. (“The dead left in the open reek, and those who live with their dead can become ill, and the water becomes foul when in contact with these many dead.”)

The eagerness to resolve the situation also leads to medicolegal autopsies which, because they are carried out under difficult conditions where it might not be possible to use correct techniques, are inadequate for the objectives of legal investigation. In other cases, the magnitude of a tragedy or the difficulty in accessing the site of the event result in a premature declaration of the tragedy site as sacred ground, without any attempt at recovery of the corpses.

In addition to the above reasons, there are those of a psychological nature that act on the unconscious plane and confront us with the reality of our own vulnerability or that of loved ones; this makes the vision—frequently characterized as Dantesque—of scores of dead bodies unbearable. The human being, to a certain extent, structures the mental image of itself, through recognition of the image of the body of its fellow human. Perhaps for this reason there is no human society that does not have a relationship with the dead: it respects them, buries them, and guards them.

That image of the self is the source of identification with the dead; “they should be preserved because I am, or because they have to do with me.” There is a mirror image at stake: I take on the other (as in a mirror), and the other takes on me (specular image).¹⁸ It is obvious, then, that to share a space with a corpse or, worse, with a number of them, causes such great anguish that it overwhelms the most rational approaches to the problem. These approaches are based on scientific knowledge and often form a part of advance plans that are then quickly put aside: the one who is there, being attended to, could be me, so it is necessary to bury the body rapidly, to remove it from view, and to conceal it.

The rapid appearance of putrefaction confronts the human being even more directly with its mortal end.¹⁹ This aspect is overwhelming and is perceived to be unmanageable using the available resources. The response is to apply the hurried measures already mentioned, thereby preventing appropriate investigative and ritual processes, while the measures are defended with semi-scientific or political justifications.

DISASTER MANAGEMENT EXPERIENCES

In this section we present vignettes of events where the response to disasters illustrates socio-cultural aspects already referenced and their impact on decision-making. We collected representative experiences with the hope that they can help those who must confront similar events. Being aware that such situations are possible can strengthen the resolve to resist immediate and inevitable pressures and to offer the

¹⁸ Massota O. Lecturas de psicoanálisis Freud y Lacan. Chapter 5: Identificaciones. Editorial Paidós, Colección Sicología Profunda, vol. 154, Second printing, 1995, page 64.

¹⁹ Ariès, op. cit.

community, in the long-term, a better chance at repairing the damage suffered as a result of a disaster.

The needs posed by a professed religion or by the emotional tension experienced by all involved in a disaster should be attended to promptly and calmly by experienced personnel who are trained for this purpose. As discussed in the chapter on psychological aspects (Chapter 5), expressing sympathy about the tragedy provides a modicum of relief, and a rapid change in attitude. It is necessary to extend the training of personnel from various social disciplines—psychologists, psychiatrists, social workers, etc.—to serve the community and families in these difficult circumstances.

An aviation accident resulted in 160 deaths; all victims underwent medicolegal autopsies and all were identified. Initial processing took 5 days and a team of about 40 people.

Despite the fatigue of the forensic team—after 24 hours of uninterrupted work—they always found the time to listen and respond to the concerns of family members: a) the team understood the urgency of the timely delivery of bodies so that the funeral ritual could be carried out before Saturday, a day that is sacred for the Jewish community; b) they attended to demands that seemed unreasonable to them, such as examining and delivering the requested bodies even though arrangements could not be made in the early morning for transfer to their places of origin; and c) they explained the technical procedures to individuals who requested the delivery of a fragment of any body, regardless of whether it was from a family member.

Paradoxically, when the team responded to the most irrational requests from the bereaved, they were also shown the greatest gratitude and relief. The attitude, which was initially aggressive, changed among those who waited for the two days from the time of the accident until the accident scene was processed.

Another difficulty was the anxiety of the local authorities who for the first time were dealing with an event of such magnitude. They called attention to the initial slowness of the work being done in the morgue, which they did not understand either in terms of its complexity or necessity. Nor did they understand that the forensic team did not have protection and at times were physically threatened. It was helpful to confront the authorities with the fact that without the technical work and organization of the morgue it would be impossible to decide which remains were to be delivered to which family.

In difficult circumstances it is still possible to achieve satisfactory results by applying basic technical and scientific concepts. These include having a complete file that makes it possible to identify corpses as soon as elements for comparison are available, including: photographs, dental charts, fingerprints, records of distinctive marks, basic anthropological variables (e.g., sex, height, approximate age, race), and samples for DNA typing. The final destination of unidentified remains can be controlled by burying them so that they can be exhumed when identification is possible, so they can be returned to their relatives and finally buried in accordance with their beliefs.

In the case of warfare in a rural area of Colombia,²⁰ there were 17 fatalities—5 women and 12 men between 18 and 23 years of age—among the guerrilla fighters. Autopsy showed that all the victims presented injuries by projectiles from high-powered firearms. As family members did not come forward to assist in identification or to claim the bodies, the bodies were buried in duly marked, individual graves in the local cemetery along with the appropriate identification files.

Government authorities should understand the socio-cultural basis for healthy mourning in order to avoid the unfortunate consequences that have occurred, historically, in poorly handled cases. These consequences have ranged from simple pilgrimage to the site of the event, to serious changes in the community caused by the rupture of social ties among large numbers of affected people. This is illustrated in the analysis of what happened during the First World War, when Victorian society prohibited mourning and repatriation of corpses of those killed in battle:²¹

For patriotic and nationalistic reasons in Britain, it was necessary to show that the horrible deaths of so many young men in the First World War occurred for a just cause; this was done through collective celebrations instead of individual burials which, because of the difficulty and high costs of repatriation of the corpses, were even prohibited. The use of black as a symbol of mourning was discouraged, and black armbands were replaced with white ones.

The results of these governmental decisions were seen in the pilgrimages of up to 140,000 people traveling to the “Devastated Regions” in Europe every year, attempts at plundering the graves in order to recover the bodies, and the so-called “delayed grief” reactions. Furthermore, there was a national obsession with death, manifested by commemorations and monuments aimed at demonstrating to society that the sacrifice had been worthwhile. While this approach was considered to have been successful during the fighting, British society emerged from the war confused and troubled, with many members left with unresolved grief about mourning that could not be publicly expressed and in need of rituals that could truly reincorporate the bereaved back into society.

The events described below following the crash of an Israeli airplane into a residential area with a high percentage of immigrants in Amsterdam illustrate the transforming possibilities of collective mourning over loss when the symbolic features of a community are united in a highly secularized society.²²

In October 1992, an Israeli cargo plane crashed into a residential area of Amsterdam. Although it was feared that there were some 250 dead, rescue

²⁰ This refers to conflict in Ricaurte, a settlement three hours away from Pasto, capital of the Department of Nariño, Colombia, on 13 August 2003.

²¹ Bourchier, Christine. “Rituals of mourning: bereavement, grief and mourning in the First World War.” M.A. Program, Department of History, University of Calgary. Available at <http://grad.usask.ca/gateway/archive13.html>.

²² Nugteren, Albertina. “Comportamiento ritual público y colectivo después de los desastres: ¿una manifestación naciente de religión civil?” Tilburg University, Netherlands. Paper presented at the Conference on “Spiritual Supermarket,” Religious Pluralism in the Twenty-First Century, London School of Economics, April 2001. <http://www.cesnur.org/2001/london2001/nugteren.htm>.

operations reduced that number to 43. The dead and injured were mainly immigrants, many of them illegal. One week after the crash, public mourning rituals took place with the involvement of some 40,000 people of all races and creeds. There was a procession that more than 13,000 people attended; it was nonpartisan, without political placards or slogans; church bells rang throughout the country, and children carried black balloons or flower garlands. The memorial service, with the participation of many cultures and religions, lasted two hours and a half. The speakers were dignitaries and representatives from the afflicted neighborhood, who cited Christian, Moslem, Jewish, and Hindu religious texts. Music from six different cultures was performed, and religious sentiments were discreetly expressed. A spontaneous monument appeared: a tree that survived at the site of the crash and “had seen it all.”

CONCLUSIONS

For a variety of reasons, there is a normal reaction of anguish both privately and collectively when there are many fatalities as the result of a major disaster. There are now technical and scientific resources that make it possible to manage mass fatalities, and to respect the importance of a community’s ability to carry out their own rituals.

Acceding to these rituals implies avoiding hastily taken actions of mass burial or incineration, which would preclude identification of the victims and return of the bodies to relatives who require the physical presence of the body in order to perform funeral rites. Even for highly fragmented or charred remains it is possible to individualize the remains by using two resources: the development of data files that will permit identification at later stages when the information necessary for comparison is made available, and control of the disposition of the remains, ensuring that it is possible to retrieve them when necessary.

Throughout this chapter we have reviewed the importance of assisting the mourning process by supporting the rituals that each culture has developed in order to relieve pain and heal grief. Efforts made in this regard will be repaid many times over in the long term through repair of the social fabric affected by the disaster, and will thereby prevent devastating psychological and social consequences.

Of continual concern in the world press is the proper management of corpses to administer justice in criminal cases, to maintain historical memory, and to achieve the moral and economic reparations that are key to the resolution of hatred and long-lasting conflicts. It is the political and governmental agencies that should recognize this need in order to make decisions that will lessen the violence and disturbances brought on by unresolved grief. Processes not carried out according to the guidelines discussed here give rise, in the long run, to major emotional disorders and even to expenditures such as the high cost for exhumation of corpses from common graves in the attempt to achieve the aims mentioned above.

Government authorities should understand the socio-cultural basis for healthy mourning in order to avoid the unfortunate consequences that have occurred, historically, in poorly handled cases.

To relieve the psychological sequelae of disasters and achieve management objectives, it is possible to design and carry out simple, organized, and systematic medicolegal investigations that are adapted to the special circumstances surrounding a disaster. In addition to the benefits already mentioned, such investigations will provide the opportunity for scientific examination of injuries and help to process cases which might require legal action.

In our experience, regardless of the diversity of cultures, rituals, and creeds, relatives of disaster victims particularly value the efforts taken to return the corpse to the family. This also is true of the ceremonies performed at the site of the death when family members are unable to claim the body or ceremonies that respect the traditions of a particular religion or group. Culturally, a funeral is more than simply disposing of a corpse: it satisfies the intense desire to give some meaning to a death when we are forced to confront it, and gives dignity and meaning to the loss of a human being.

When disasters strike a community, a city, or a nation, there is mass public mourning that involves large numbers of people, often of heterogeneous characteristics. Despite this, when such an event is properly managed it is possible to create an environment that allows commiseration, expressions of sympathy, and consolation through collective commemorations that offer the relief that ritual provides.

On these sad occasions, as well as after the untimely deaths of celebrities such as Olof Palme, Princess Diana, or Yizhak Rabin, a temporary community is created, and one belongs to this community only because of a tragedy. First, Rousseau, and then Durkheim applied the term “civil religion” to manifestations of the “positive multitudes” who value collectivity as an ideal in itself. Unexpected deaths create moments of collective mourning that can become community protest. Burial becomes the ritual to channel the grief, express social support, handle the loss, and dilute the anger. Even though the collective expression is about desperation and vulnerability, it also allows the expression of compassion and sympathy, and provides an occasion to share a moment of solidarity.

Thus a community can express sympathy to family members and take part in something that is larger than them, and collectively receive solace from the company, the words, the music, and the flowers in the presence of grief that is a part of human fragility.

“For a civilization to deserve that name, all of life must be valued, including the (absent) life of the dead”.²³

²³ Reyes, Mate (2000). *Memoria de Auschwitz*. Chapter 2: El campo, lugar de la política moderna, Madrid: Editorial Trotta, 2003, page 78.

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CHAPTER 5: PSYCHOLOGICAL ASPECTS

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Any form of mass burial always has a very negative psychosocial impact at the individual and community level since it is contrary to the very understandable desire that everyone has of giving a worthy farewell to our family members and friends. Another problem resulting from mass burial is that corpses are not identified which increases grief and uncertainty, and complicates the mourning process for the survivors.

INTRODUCTION

Even though the number of the dead and the missing caused by disasters (earthquakes, hurricanes, floods, volcanic eruptions, and events caused by humans) are tending to diminish, thanks to increasingly efficient warning systems and improved disaster preparedness for communities, there are still events that have a very high death toll.

The presence of a great number of dead bodies after a disaster creates uncertainty and fear in the population that can be exacerbated by incorrect information that the bodies present the threat of epidemics. There is also tension and a widespread feeling of grief; the reigning chaos and highly charged emotional climate can result in behaviors that are difficult to control. This type of situation requires appropriate psychosocial interventions for the individual and community.

But mass fatalities do not only result from natural or man-made disasters: they frequently occur in warfare. In the last few decades many countries of Latin America have undergone internal armed conflicts that have been characterized by massive human rights violations. Violence has been used as a means of social control by participating forces and there have been frequent, indiscriminate massacres of civilians, including of women, children, and the elderly. In addition, the majority of these massacres have been the product of processes that involved prior psychological manipulation.

The demands made by communities (or by authorities) for burials to be made in common graves occur almost always because of unfounded rumors and beliefs about the danger of epidemics or decomposition of corpses, or to provide a “rapid solution to problems to avoid more trauma.” However, the family as a social unit will never agree to burying its relatives in that manner or without respecting the prior, obligatory identification of a corpse. In addition, unnecessary haste in carrying out mass burials can result in later disputes and claims, as well as leaving psychosocial impressions that make the recovery process difficult.

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In cases of armed conflict, the recovery of historical memory has been part of the strategy to restore the social fabric. This involves exhuming and delivering the remains to families so that they can carry out their customary mourning rituals, thereby dignifying the victims.

The management and disposal of corpses is a problem with serious psychological implications for the family and the survivors, in addition to other political, socio-cultural, and health considerations. It also involves the issue of human rights, which cannot be overlooked.

SPECIFIC VULNERABILITIES

Vulnerability results from a dynamic process where various factors interact to determine whether or not psychiatric pathology or other emotional and human behavioral problems appear.

Massive fatalities and major material losses in the context of a disaster present a condition of high psychosocial risk. Those providing mental health care should recognize differences in vulnerability, especially as it relates to gender and age, as well as risk to the emergency response team members.

Mass fatalities can have different effects on male and female populations. There is evidence that while the mental health of men is affected more immediately, women suffer for a longer time, and psychological disorders manifest themselves later.

Social and cultural patterns influence the differences in how men and women react: men tend to repress painful emotions, have a difficult time talking about feelings, and when they do, they interpret it as weakness; women tend to communicate more easily, to express their fears, and to seek support and understanding for themselves and their children.

Women are more frequently confined by domestic responsibilities and it is more difficult for them to be integrated into their communities. They can be overcome by feelings of solitude and isolation, and sometimes they have to assume the role of head of household due to the death or disappearance of their husbands or older children. This can lead in the medium- or long-term to depression; moreover, access to health services is often more difficult for them.

In some cultures the elderly are a source of experience and wisdom and have the historical memory of how populations, over time, have confronted critical situations. However, there are also aspects of exclusion: some are isolated, lack support networks, are perceived as a burden, and are not taken into account as active and productive factors in a community. Another psychosocial risk factor exists in that frequently the elderly have suffered losses before, and at this stage of life have more evident health problems and disabilities.

Another vulnerable group includes the children who, following a traumatic event, have less understanding of what has happened and are limited in their ability to com-

municate their feelings. Some children completely deny or show indifference when they learn that they have lost one or more of their family members; the emotional impact is so intense that frequently they do not speak about what they have experienced. Some think that the child has forgotten, but this is not the case; he or she is able to recall and talk about the traumatic experiences they have undergone once their feelings of fear are under control.

The post-traumatic reactions in children should be attended to rapidly. Assuming that children “do not feel” or “do not understand” is a serious error that leaves them exposed to suffering and fear.

GRIEF

It is to be expected that after the death of one or more loved ones, that sadness, suffering, and grief will arise. The grieving period is when a person assimilates what has happened, understands it, overcomes it, and rebuilds his or her life. This is a normal process that should not be hurried or discouraged; nor should it be regarded as an illness.

In our culture, we feel the need to remember our loved ones and to commemorate their life and death as a way of expressing that they “will not be forgotten,” while dealing with one’s own feelings of sadness. The grave, a headstone, a photograph, or flowers in the home are common ways of expressing this. Performing rituals established by one’s culture and community forms an important part of the recovery process for the survivors.

Grief is experienced with a mixture of sadness, anxiety, fear, and anger; in the most critical moments there are extremes of very intense emotional pain and despair. Afterwards, progressive relief comes and concludes with expressions of renewed confidence and hope.

The grieving process implies:

- ◆ Freeing oneself from, or leaving behind the relationship with the deceased person;
- ◆ Adapting to the world under different conditions; and
- ◆ Making the effort to establish new relationships.

The way that loss is confronted and grief is endured is closely linked to the following factors:

- ◆ The personality of the survivor and the strength of his or her defense mechanisms;
- ◆ The relationship with the deceased;
- ◆ The circumstances in which the event occurred; and
- ◆ The social support network (family, friends, and community).

In situations of mass fatalities, several authors have described the survivors' fears and feelings:¹

- ◆ Grief and distress because of the loss of family members and friends which, sometimes, coincides with material losses. There also are more subtle and sometimes intangible losses, such as loss of faith in God, loss of meaning in life, etc.;
- ◆ Practical fears: having to assume new roles that are imposed after the disappearance of a family member (for example, the widowed wife who becomes the head of the household, or the widowed father who must take charge of the children);
- ◆ Recurrent fears that something can occur again or that death will befall other members of the family or community;
- ◆ Personal fear of dying: fear of the unknown or fear of facing God;
- ◆ Feelings of solitude and abandonment: it is common for survivors to feel that family members and friends have abandoned them at a difficult time;
- ◆ Fear of forgetting or being forgotten;
- ◆ Anger toward the deceased which is taken out on family members or close friends;
- ◆ Some measure of guilt for someone's death; sometimes, what takes place after the death of a loved one increases this guilt;
- ◆ Shame following the death of a loved one because of circumstances that surrounded the death of that person (your behavior, humiliation, etc.); or shame about the conditions in which a family is left following the disaster.

The most frequent psychological manifestations associated with grief are:²

- ◆ Very vivid and repetitive reminders of the deceased and of what happened;
- ◆ Nervousness or fear, sadness and weeping;
- ◆ Desire to die;
- ◆ Problems sleeping and poor appetite;
- ◆ Problems with memory and difficulty concentrating;
- ◆ Fatigue, lack of motivation, and difficulties returning to normal level of activity;
- ◆ Tendency toward isolation and solitude;
- ◆ Combination of feelings or emotions such as: self reproach, blaming others, frustration, impotence, anger, feeling overwhelmed, etc.;
- ◆ Neglect of appearance and personal hygiene;

¹ James JW, Friedman R, *The Grief Recovery Handbook* (New York: Harper Perennial, 1998); Matsakis A. *Survivor Guilt: A Self-Help Guide* (Oakland: New Harbinger Publications, 1999); Prewitt J, *Ayuda psicosocial en desastres: un modelo para Guatemala* (Guatemala: American Red Cross, 2002); Rodríguez J, *Principios generales para la atención psicosocial en situaciones de desastres* (paper presented at the Congreso Latinoamericano de Psiquiatría—APAL; Guatemala, June 2002).

² Organización Panamericana de la Salud, *Protección de la salud mental en situaciones de desastres y emergencias* (Washington, D.C.: OPS/OMS, 2002); Rodríguez J, *Psicoterapia: una relación de ayuda* (Guatemala: Empretec, 1999).

- ◆ Physical manifestations such as dizziness, nausea, headache, chest pain, tremors, difficulty breathing, palpitations, dry mouth, and high blood pressure.

THE PROCESS OF UNRESOLVED GRIEF

In all societies there are rituals, norms, and forms of expressing grief that are derived from different conceptions about life and death. In Latin American culture certain rituals have evolved, such as vigil over the corpse for 24 hours, burial, friends accompanying the family, performing religious ceremonies after the burial, and observing anniversaries of the death.

When there are massive fatalities, missing persons, and unidentified corpses, this process is changed and the different facets of grieving cannot be observed. In many cases, the corpse is not recovered, producing a feeling of emptiness, of “frustrated or unresolved grief.”

In catastrophic disaster conditions and in war, grieving entails the need to face many losses and it takes on a broader meaning that applies to the community as well. It implies the rupture of a life’s plan, not only in the family dimension, but in social, economic, and political dimensions as well. It is possible, then, to identify not only the individually experienced grief of people in the family setting, but there is also “collective grief” that implies an emotional atmosphere of suffering and anger that affects the community dynamic. Fears and feelings merge, communication channels are blocked, and the behaviors of the group change. Subsequently, it is necessary to work on the historical memory of the affected group.

When violence is the main cause of a death, it is more difficult to confront the pain and to proceed with normal mourning; the suffering increases and traumatic reminders persist. When massacres have been carried out in public, the impact of the death of loved ones is compounded by having been witness to atrocities. Survivors experience the senselessness of death and a profound sense of injustice, and feel conflicting emotions and reproach for “not having done anything.”

Forced disappearances are an inhumane method frequently used by the forces participating in armed conflicts in our region. In many natural disasters and man-made accidents, disappearances also occur. Although the family is certain that the missing person has died, living with that loss is much more difficult. Ambiguity of thoughts and emotions arise and there is additional concern about how the death occurred and what happened to the corpse.

The circumstances that make the grieving process the most difficult to face include:³

- ◆ Disappearances;
- ◆ Inability to recognize corpses;

³ Oficina de Derechos Humanos del Arzobispado (Human Rights Office of the Archdiocese—ODHA), *Guatemala: nunca más*, Report of the Recovery of Historical Memory (REMHI) project (Guatemala: ODHA; 1998); Rodríguez J, Ruiz P, *Recuperando la esperanza* (Guatemala: OPS/OMS, 2001).

- ◆ Collective burials;
- ◆ Massacres; and
- ◆ Situations, in which family members know of the death and are able to carry out a burial, but have many feelings of anger due to the brutality and injustice of the death.

Unresolved grief leads, frequently, to the appearance of psychiatric disorders that require more specialized interventions, as shown in the following cases from Guatemala, Colombia and Peru.

Selection of testimonies compiled in the document *Guatemala: Nunca Más*.⁴

“We saw how they killed the people: the young people; women who were still young girls. So many people were sad: the women for their spouses; people who were poor who could no longer find anything to do for their children. Hence, we are still sad.” Case 2230 (massacre) Jolomhuitz, Huehuetenango, 1981.

“Those who died there, rotted there; no one picked them up, no one buried them because they said that if one of us picks them up or goes to see them, they will kill us in the same place. It was one of them who buried them. I still do not know how they ended up, if some animal or dog ate them; I don’t know...My heart always aches and I think about the violence they endured.” Case 2198, San Pedro Carchá, Alta Verapaz.

“The civilian dead, friends, and enemies, will be buried by military personnel as quickly as possible to avoid the subversive elements using them in their work of agitation and propaganda.” (Counterinsurgency Manual of the Guatemalan Army, page 208.)

“One year we were very sad. We no longer weeded our corn and it died on the mountain. It was hard to get through the year, our heart was no longer happy...It was hard to get back our spirit. Everyone was very sad, our relatives were very sad. One girl was saved; now she is a grown woman and when she remembers, she cries.” Case 553 (massacre), Chiquis, Alta Verapaz, 1982.

“They were piled in the courtyard of the house; after five or six days the army ordered us to bury the dead. We went and we buried them; but they didn’t go to the cemetery, we just buried them in a place. We found a pit in a ravine where we piled them up and started a fire. It made us sick to do this; we no longer wanted to eat. I saw one who had his chest open; his heart, his lung, everything was outside; another one’s head was twisted backward and his face was in the sun. After two or three months they were removed by their families; they took them to the cemetery but it was not good. They were only liquid and bone; they were just piled in the boxes. They put together about five boxes and we took them to the cemetery, but we got sick. I saw that myself in those times.” Case 1368, Tierra Caliente, Quiché, 1981.

“...in every pit they put thirty, forty people. We couldn’t fit more or we would have to cut them at the knees so that they would fit in the bottom of the pit... and we threw gasoline on them and that flame rose two, three arm

⁴ Oficina de Derechos Humanos del Arzobispado, Guatemala, *op cit.*

lengths in height. Moans were heard inside the fire; they cried and shouted.” Case 1741 (victimizer), Izabal, 1980-83.

The disaster of Armero (Colombia), 1985⁵

The town of Armero, in the Colombian Andes, was destroyed on 13 November 1985 by a volcanic eruption that caused an avalanche of ash, boiling mud, rocks, and trees. The landslide was almost 2 km wide and reached speeds of 90 km/h. It killed 80 percent of the 30,000 inhabitants of Armero, and left almost 100,000 inhabitants homeless in the surrounding region.

It was impossible to recover the corpses of the dead since the vast majority were dragged a great distance and buried under tons of sand and rubble. This situation prevented traditional ceremonies from being carried out, and many months after the disaster, family members were excited by rumors that the dead had been seen nearby or in far-off places, or wandering like a lost madman. Each of these false reports revived new hopes that were always followed by new disappointments. Two years after the tragedy corpses were found that were able to be identified; this motivated the families to seek the remains of their relatives in order to carry out conventional religious and cultural rites.

In the places where the houses stood, and which could more easily be identified later than in the immediate months after the disaster, headstones were placed with the names of the dead, and relatives now place flowers and say prayers there. They have become symbolic graves where families can conduct memorial activities, albeit belatedly.

A devastating fire in Lima, Peru⁶

On the night of 29 December 2001 at about 7:15 pm, a major fire broke out in the “Mesa Redonda” shopping district in Lima’s historic downtown, killing approximately 270 people. The fire was caused by improper storage and handling of fireworks.

Many of the bodies were charred which meant that visual recognition by family members was very difficult. Twenty seven psychologists from the Peruvian Society of Emergency and Disaster Psychology, 87 volunteer psychologists, and 60 volunteers from various professions participated in crisis intervention and accompanied family members.

First response was made by the fire department, which worked for more than 14 hours to control the fire; they were affected by the enormous number of people who were calling for help. Squadrons from the municipal civil defense responded, but for the most part young, inexperienced volunteers were providing assistance. Many members of the relief teams were impacted emotionally by the huge number of corpses they had to see and handle, among whom were children clinging to their mothers in a futile attempt at protection.

On the first day of work (31 December) at the central morgue, they still were not sure how to conduct the visual recognition of the remains and expect-

⁵ Desjarlais R. et al., *World Mental Health: Problems and Priorities in Low-income Countries* (New York: Oxford University Press, 1995); Programa de Cooperación Internacional en Salud Mental “Simón Bolívar”, *Desastres, consecuencias psicosociales. La experiencia latinoamericana* (Serie de Monografías Clínicas No. 2. Illinois (U.S.): Centro de la Familia Hispánica; 1989).

⁶ Valero S., *El afronte de la muerte* (Lima, 2002; unpublished).

ed a slow process since each of the bodies was to undergo autopsy. This resulted in confusion for family members who waited in line for hours to see the bodies. As bodies continued to arrive, they were piled in a courtyard next to the autopsy room, and people had to return to stand in line time and again. The system using photographs of the victims was not very helpful since the faces were disfigured.

Under these very frustrating circumstances rumors began to circulate among family members. It was said that they were removing body organs to sell, that bodies were being hidden so they could be used by medicine students, and that they were going to burn the remains, which would make later DNA identification impossible. All of the rumors and frustration caused many people to become verbally abusive and to make indiscriminate threats and protests.

Another difficulty was that once a body had been visually identified, families had to wait many hours for bureaucratic transactions to be completed before they were allowed to take the body.

Psychosocial intervention in the morgue was divided into two major groups. Outside of the morgue, psychologists approached groups of 6 to 8 people at a time to give them accurate and up-to-date information. At the same time, they coordinated with the Archdiocese of Lima so that Catholic priests would be present.

Groups of 20 (up to three family members per missing person) were allowed inside the morgue, where they were given instructions, were told about the condition of the bodies, and given directions about where to go. A psychologist or volunteer was assigned to accompany them. On the second day, and under increasing pressure, they allowed entry into the area of the morgue where there were unrecognizable bodies. People were able to positively identify some of these bodies. Inside the morgue a medical station was set up where, when necessary, family members were approached by the crisis intervention team.

A tent was set up by an office of the Ministerial Council of the President, which was responsible for offering funeral services free of charge.

Bodies that could not be identified were sent to a pavilion in the El Angel Cemetery of Lima. This relieved the fears of many family members who thought the remains would be incinerated or placed in a common grave. This action made it possible for many families to grieve more effectively, with the consolation of having a place where they could put a bouquet of flowers or say a prayer.

PSYCHIATRIC DISORDERS AMONG SURVIVORS

In light of a very significant and shocking emotional situation—the death of loved ones—certain feelings and reactions are common; grief usually implies a high level of anguish and unhappiness in people. Moreover, the recollection of what has happened always will be part of the life of the victims and will never be erased from their

memory. But it has been demonstrated that only some subjects experience more serious or lasting problems that could be described as psychopathology.

Some psychological manifestations are the understandable response to traumatic experiences, but they can also be indicators that one is presenting a pathological condition (particularly in conditions of unresolved grief). Psychological assessment should be made in the context of the events, determining whether they can be interpreted as “normal or expected” responses or, on the contrary, identified as psychopathologic manifestations that require a professional approach.

Some criteria for determining whether an emotional expression is becoming symptomatic are:

- ◆ Prolongation;
- ◆ Intense suffering;
- ◆ Associated complications (for example, suicidal behavior); and
- ◆ Significant affects on the social and routine functioning of the individual.

The most common immediate psychological disorders in survivors are episodes of depression and acute, transitory stress reactions. The risk that these disorders will appear increases in accordance with the nature of the loss and other vulnerability factors. Following disasters, increased violent behavior has been observed, as well as excessive alcohol consumption.

Among the delayed effects there are reports of pathological grief expressed as depression, adaptation disorders, manifestations of post-traumatic stress, abuse of alcohol or other substances, and psychosomatic disorders. In wars and long-lasting conflicts, the patterns of suffering are manifested as sadness, generalized fear, and physical expressions of anxiety; such symptoms frequently become serious and long-lasting.

Complicated grief can lead to a depressive disorder⁷ that is characterized by extreme sadness, loss of interest and enjoyment in things, reduced levels of activity, and exaggerated fatigue. Other symptoms include reduced attention span and concentration, loss of self-confidence, feelings of inferiority, guilt feelings, negative prospects about the future, suicidal thoughts or acts, sleep disorders, and loss of appetite.

Adaptation disorders are characterized by a state of personal discomfort, emotional disorders that affect one's social life, and difficulty in adjusting to the fundamental changes that the loss represents.

Post-traumatic stress is a delayed or deferred type of disorder that appears as a consequence of exceptionally threatening or catastrophic events; it starts after the trauma with a latent period that lasts from a few weeks for up to six months. Often, only a few of the following post-traumatic stress symptoms are exhibited:⁸

⁷ Clasificación Internacional de las Enfermedades (CIE-10). Trastornos mentales y del comportamiento. Descripciones clínicas y pautas para el diagnóstico. 10th revision. [ICD-10, International Classification of Diseases; World Health Organization (Madrid: Mediator, 1992)].

⁸ Organización Panamericana de la Salud, *op cit.*; Rodríguez J. (2002), *op cit.*; ICD-10, *op cit.*

- ◆ *Re-experiencing the trauma:* recurrent and intrusive memories, nightmares, and flashbacks;
- ◆ *Avoidance of stimuli associated with the trauma:* efforts to avoid conversations, situations, places, or people that remind the person of the event;
- ◆ *Dissociation:* sensations of numbing or unreality, dazed as if in a dream; inability to remember important aspects of the trauma;
- ◆ *Decreased ability to respond to the outside world:* inability to feel emotions, feeling of detachment from others;
- ◆ *Increased activity:* hypervigilance, irritability, or attacks of anger;
- ◆ *Significant anxiety:* occasionally extreme outbursts of fear or panic;
- ◆ *Depression:* frequent suicidal ideation;
- ◆ *Insomnia;*
- ◆ *Vegetative symptoms;*
- ◆ *Alcohol or drug consumption can be an aggravating factor.*

There have also been reports of an increase in the number of suicides in periods after massive fatalities as a consequence of natural disasters or war crimes (for example, in Guatemala and Armero, Colombia).⁹

Suicidal behavior

Reports suggest that in recent years there has been a significant increase in the number of suicides in areas where massacres took place. Although there are no exact studies, and other factors can be an influence, an analysis of death records from the city of Rabinal (Guatemala) showed an evident increase of death by suicide which had been very rare in most indigenous cultures prior to the 1980s.¹⁰

Among the most significant delayed effects noted as a result of the Armero disaster (Colombia) was the high number of suicides occurring among survivors in the first year after the tragedy. It is possible that the figures were even higher than reported, since suicide tends to be concealed or disguised as accidental death [H. Santacruz and J. Lozano cited in “Desastres, consecuencias psicosociales.”]¹¹

Effects of Hurricane Mitch on mental health of the Honduran adult population¹²

Hurricane Mitch ravaged Central America beginning on 25 October 1998. Honduras suffered the worst effects of this natural disaster.

9 Oficina de Derechos Humanos del Arzobispado, Guatemala, *op cit.*; Programa de Cooperación Internacional en Salud Mental “Simón Bolívar”. *Desastres, consecuencias psicosociales. La experiencia latinoamericana* (Serie de Monografías Clínicas No. 2, Illinois: Centro de la Familia Hispánica; 1989).

10 Oficina de Derechos Humanos del Arzobispado, Guatemala, *op cit.*

11 Rodríguez J. (2002), *op cit.*

12 Rodríguez J, Bergonzoli G, Levav I. “Violencia política y salud mental en Guatemala” (*Acta Psiquiátrica y Psicológica de América Latina* 2002;48:43-4).

The Pan American Health Organization (PAHO/WHO) and the Honduran government estimated that more than 1.5 million people were affected, 5,657 died, another 8,058 were missing, and 12,272 were injured. Some 285,000 were made homeless and had to seek housing in one of the 1,375 temporary shelters established. However, there has been little information about the effects of the disaster on the mental health of the population.

The impact of a disaster on mental health is the result of several factors that need to be considered, such as the death and disappearance of family members, neighbors, and friends. Research has demonstrated that disaster can give rise to grief, post-traumatic stress, and other psychiatric disorders, a combination of these reactions, or no problems. Other disorders, such as violent behavior, may present as well. This can evolve toward chronic disorders or to resolution of the acute reaction. Change in conditions, biological and psychological predisposition, occupation and socio-demographic factors, cultural elements, the quality of relationship with the deceased, the nature of the intervention, confirmation of death versus presumed death, and social support causes results to vary.

The mental health of the Honduran population will require continuous surveillance in order to determine the long-term impacts of Hurricane Mitch. Recovery can be prevented by secondary stress factors, including exposure to violence. Individuals subject to secondary stress can be more vulnerable and have higher indices of post-traumatic stress, greater depression, disability, and psychological discomfort. It is necessary to identify the individuals at risk and factors that can mediate that risk, so that services and appropriate interventions can be implemented.

NOTIFICATION OF DISAPPEARANCE OR DEATH, AND VISUAL RECOGNITION OF CORPSES

Notification of death can take place in the home, in a health center, in a morgue, or in another setting. It is a critical moment and is difficult to handle since it can result in strong reactions. Following are some recommendations for providing notification:

- ◆ Compile as much information as possible about the deceased and the event before making the notification;
- ◆ Obtain information about the people who are going to be notified;
- ◆ Make sure that the most appropriate adult family member is the first to receive the news;
- ◆ Make the notification in a direct and personal manner. Where possible, two people should make the notification;
- ◆ Observe common rules of courtesy and respect;
- ◆ Do not take personal objects of the deceased to the interview;

- ◆ Invite family members to be seated. The people making the notification should do the same;
- ◆ Observe the surroundings carefully in order to prevent any hazards, and be prepared to attend to children or others;
- ◆ The message should be direct and simple. Most people will realize from the setting that something terrible has happened, and their agony or anxiety should not be prolonged. Those receiving the news should not be left with any doubt or be given false hopes about the situation;
- ◆ Be prepared to present evidence and answer questions;
- ◆ Help the family members to notify others, if the family so requests;
- ◆ Listen and serve the immediate needs of the family members, as well as reminding them of their rights.

Notification of death should always be done individually (case by case). Giving information of this nature to a group should be avoided. Where necessary, several teams or pairs should divide up the work.

If the person is missing, it should be reported as such. This initiates a process of anticipatory grief, but also helps if those missing are subsequently confirmed to be dead.

It is important to explain the circumstances surrounding a case when it is likely that the death or whereabouts of the missing person cannot be confirmed in the short term (or, perhaps, never).

If there are doubts about the identity of corpses, the type of investigations that will be conducted should be explained. To avoid conjecture, it should be made clear that no reliable information can be provided until the investigation has concluded.

An important problem to deal with in cases of mass fatalities is visual recognition of the corpses. Various participants are involved in this very complex process, including: family members, authorities, morgue workers, medical and psychological assistance teams, as well as the mass media.

The people (at times, adolescents) who are forced to face the difficult task of identifying dead bodies are exposed to a very traumatic situation. Family members who are going to identify the remains of their loved ones can manifest this trauma through expressions of despair, frustration, and, occasionally, protest or disagreement with the procedures being used, etc. This can escalate if the bodies are decomposing or are mutilated or burned, as occurs in fires or aviation accidents.

If bodies are not located or cannot be recognized, it should be expected that a variety of rumors will spread. These should be countered by timely and accurate information. Family members should be allowed to view all the bodies, regardless of their condition, since the relatives will do everything possible to identify their loved ones. If this is not allowed, protest and even violence might result.

Medical and mental health services should be as close as possible to the place where body identification is carried out to provide physical and emotional assistance to family members.

Usually, family members ask to see the body as soon as possible, or they might be requested to the view body in order to identify it. Following are recommendations about treatment of the family in this type of situation:

- ◆ The relatives should decide among themselves who will see the corpse;
- ◆ Do not allow family members to enter the viewing area unaccompanied. It is preferable for skilled personnel to escort them and provide some emotional support;
- ◆ Offer privacy and respect so that the family can say goodbye, including allowing them to touch the body;
- ◆ Respect any type of reaction that the family members might have at that moment;
- ◆ If the body is altered or mutilated, the family should receive a clear explanation about its condition before viewing the body;
- ◆ If photographs are used, describe them before showing them to relatives. The photograph system can be effective in situations with a limited number of corpses, but when there are numerous bodies it can cause confusion, or create a situation in which two or three families believe that they recognize the same body;
- ◆ It is almost always necessary to transport family members to the location of the corpse, and to ensure their return after viewing the body;
- ◆ Provide comfortable conditions and guarantee compassionate treatment at the site where the bodies are viewed.

PSYCHOSOCIAL CARE FOR SURVIVORS

Frequently we are confronted with a very discouraging scene, with numerous human and material losses in a situation of insecurity and anguish. The relatives of the missing are tormented by uncertainty about what actually took place. When victims have been buried in common graves or cremated without being duly identified, a situation of prolonged pain and uncertainty is created among the family members.

From the outset, it is necessary to use crisis intervention techniques for the survivors. Following are some recommended actions:¹³

- ◆ Treat them as active survivors and not as passive victims;
- ◆ Assist them and show concern about their physical safety and the health;
- ◆ Ensure that they have shelter, food, clothing, and a place to sleep;
- ◆ Provide emotional support and a sense of connection to other people;
- ◆ Ensure private and confidential communications;
- ◆ Encourage them to “vent” or tell their story and express their feelings;
- ◆ The person providing psychological assistance should be able to listen responsibly, carefully, and patiently. Members of the response teams should

¹³ Organización Panamericana de la Salud, *op cit.*; Rodríguez J. *Psicoterapia: una relación de ayuda* (Guatemala: Empretec; 1999).

explore their own conceptions and concerns about death and should not impose their views on the people they are helping;

- ◆ Do not use a medical manner when providing assistance, and do not necessarily treat the victims as patients;
- ◆ Rather than giving advice, allow survivors to reflect on what has happened and how to face the future. Advice given should refer, instead, to practical issues and available channels of assistance;
- ◆ Provide as much information as possible, and listen to doubts and problems to help find solutions;
- ◆ Encourage survivors to return to their daily routines as soon as possible;
- ◆ Prevent the interference of the media or other groups;
- ◆ Spiritual or religious support is usually a valuable way to calm family members.

An important element in handling grief is to expedite mortuary transactions and to obtain free or affordable funerals for low-income people. The delay in delivery of the corpses and uncertainty about how payment can be made for funeral services increases anguish and suffering for the families of victims. Frequently the authorities do not place importance on the issue of funeral services, especially in the midst of the chaos created by a disaster. However, funerals do have great significance for families, and the inability to have access to these services can be the motive for protests and collective unrest.

The criteria for referral to a specialist (psychologist or medical psychiatrist) are limited and specific, including:

- ◆ Persistent or aggravated symptoms that have not been relieved using initial measures;
- ◆ Major difficulties in family, work, or social life;
- ◆ Risk of complications, especially suicide;
- ◆ Coexistent problems such as alcoholism or other addictions;
- ◆ Major depression, psychosis, and post-traumatic stress disorder which are serious psychiatric conditions that require specialized care.

The use of medications should be restricted to the strictly necessary and only prescribed by physicians. Indiscriminate or prolonged use of psychotherapeutic medications is not recommended. Some, such as tranquilizers, have important side effects and can be addictive.

The vast majority of cases can and should be treated on an outpatient basis, in one's family and community environment. Hospitalization usually is not necessary. Routine, daily life is where psychosocial recovery of people after traumatic events takes place.

Recommendations for assisting children who have survived a traumatic event include:

- ◆ Use a strategy of flexible, rather than professionalized, psychosocial recovery;

- ◆ Regard the school, the community, and the family as fundamental therapeutic spaces. Teachers, community members, women's groups, and youth groups can be facilitators in work with minors;
- ◆ Strengthen the training, care, and motivation of personnel who work with children;
- ◆ Techniques using group recreation are essential tools for the psychosocial recovery of children. They should be combined with recreation and sport;
- ◆ Encourage a return to normal life, including school, as soon as possible;
- ◆ Take advantage of widely accepted traditions with regard to the care and treatment of affected minors.

PSYCHOSOCIAL CARE FOR FIRST RESPONSE TEAMS

An especially vulnerable group includes members of the first emergency response teams who are responsible for handling corpses or human remains; many are young volunteers or military personnel. Also vulnerable are those responsible for conducting autopsies; they feel overwhelmed and over-extended with the work load when mass fatality situations occur. In general, the wide range of workers who in one way or another intervene in this kind of situation should not be forgotten.

Not all professionals and volunteers are suitable for these tasks; their suitability depends on a variety of factors such as age, personality, previous experience, beliefs about death, etc. They should be well informed about the tasks they will be asked to do. We should avoid having persons under age 21 participate in handling dead bodies.

There are certain factors that increase the probability that an emergency response worker will suffer psychological disorders:

- ◆ The conditions in which the corpses are found (advanced stage of decomposition, mutilated, charred, etc.) or when only fragments of bodies can be recovered;
- ◆ Prolonged exposure to very traumatic experiences;
- ◆ Ethical conflicts;
- ◆ Simultaneous exposure to other traumas or recent stressful situations;
- ◆ Unfavorable living conditions;
- ◆ A lenient selection process for professional staff.

It is likely that the members of the emergency response teams will experience some difficulties when returning to their daily lives after the emergency tasks are completed. These problems should not necessarily be regarded as symptomatic of illness, and require, above all, family and social companionship and support.

The concept of universal vulnerability¹⁴ holds that there is no type of training or prior preparation for a person working with seriously injured and dead victims that can completely eliminate the possibility that he or she will be affected by post-traumatic stress or other psychological disorders. If major symptoms of psychopathology do appear, the cases should be referred for specialized treatment.

Following are some general recommendations for the care of members of emergency response teams:

- ◆ Consider the characteristics and the specific behavior patterns of the team. Generally, they feel satisfied about what they have accomplished and develop an altruistic spirit;
- ◆ Keeping the team active is positive: it relieves stress and strengthens self-esteem;
- ◆ Promote work rotation and fixed working hours. Team members who handle dead bodies for a certain period of time should be reassigned to other, less difficult tasks;
- ◆ Encourage team members to take care of themselves physically and to rest periodically;
- ◆ Listen conscientiously;
- ◆ Guarantee confidentiality and the ethical handling of personal situations and those of the organization;
- ◆ Redefine the crisis as a potential for growth;
- ◆ Enlist the family's help in sensitizing processes;
- ◆ Reduce stress-causing factors and assess underlying emotional conditions prior to and during the emergency;
- ◆ Create opportunities and space for reflection, catharsis, and integration of the experience. Recognize that someone's anger is not personal, but an expression of frustration, guilt, or worry;
- ◆ Encourage the team to express mutual support, solidarity, recognition, and esteem;
- ◆ When possible, the team involved in the handling and identification of the corpses should attend group counseling sessions at the end of the working day, and a week after the completion of operations.

Recommendations for personnel who have worked in the handling of corpses, after they return to normalcy and reintegrate into daily life are:

- ◆ Return to your routine as soon as possible;
- ◆ Do physical exercises and relaxation exercises;
- ◆ Seek contact with nature;
- ◆ Get enough rest and sleep;
- ◆ Eat balanced and regular meals;

¹⁴ Organización Panamericana de la Salud, *op cit.*

- ◆ Do not try to lessen the suffering by using alcohol or drugs;
- ◆ Seek company and speak with other people;
- ◆ Participate in family and social activities;
- ◆ Observe and analyze your own feelings and thoughts;
- ◆ Reflect on what you have experienced and its meaning in life.

THE IMPORTANCE OF TRUTHFUL, APPROPRIATE, AND TIMELY INFORMATION

The availability of information that is truthful, transparent, appropriate, and timely is vital for the emotional restraint of family members and the general population. This should be provided at various levels:

- ◆ Provided directly to an individual;
- ◆ Provided directly to a group and the community; and
- ◆ Provided through the communications media.

The authorities and community leaders should be prepared to provide information directly either to individual or groups, as well as to respond to questions and be ready to find answers to these questions.

The communications media have a dual nature: on one hand they are profit-driven enterprises, and on the other, they have an enormous social responsibility for the public service they provide. Information on disasters and large numbers of fatalities is often exploited as newsworthy, emphasizing the unknown and extraordinary and even manipulating certain morbid interests of the public. However, ethical and sensitive reporting about these events should be insisted on, with the objective of providing truthful, responsible, and useful information.

There are mass fatality situations in which the family members first learn about what has happened through the media. In these cases it can be expected that there will be large masses of people struggling to obtain information or to be taken as soon as possible to the site of the events.

A frequent problem is the number of people who go to morgues, hospitals, or other places in search of relatives, where admission is limited to individuals or small groups. This creates problems of congestion and disorganization. Solutions for this kind of situation should be found that are adequate, humane, and respectful to these people.

When, for various reasons, public safety personnel are not available, the work of considerable numbers of health care or relief workers must be dedicated to crowd control. In most cases the crowds are not aggressive, but because of their sheer numbers it is necessary to organize them into groups so that they can be given necessary information. It is essential to inform the public that the risk of epidemic outbreaks from dead bodies is minimal. This risk is nonexistent when bodies are buried by landslides or collapsed buildings.

For these communication tasks it is important to seek the timely support of neighbours and community organizations that have, in addition to human talent, extensive knowledge about the population and its customs.

ROLE OF THE AUTHORITIES

The role of governmental authorities, as well as of community leaders and non-governmental organizations, is very important. It is the responsibility of the health sector to advise authorities about technical and human aspects related to managing massive fatalities (social, legal, human rights, health, and psychological concerns). They can perform an important function in informing as well as monitoring the response the most affected people.

The decisions made by the authorities define, in many cases, the behavior to be followed in management of mass fatalities and in addressing the population that is living in a very complex emotional atmosphere. Hurried and inappropriate decisions can cause major and lasting damage, as well as complicating later processes of psychosocial care and rehabilitation of the population.

Regardless of the power of the authorities responsible for managing the emergency and of the epidemiological justifications used to hasten the disposal of the human remains, measures should be adopted that respect and consider the customs of the population, avoiding situations such as mass burial in common graves or mass cremations. Such measures usually are prohibited by law and violate the provisions of fundamental human rights.

It is advisable for authorities and public institutions to have spokespersons who are specifically responsible for managing information, and who can support the emotional restraint of the population. It is advisable to have regularly scheduled briefings, and to make use of official bulletins, avoiding any ambiguity in content.

CONCLUSIONS

Coping with an emergency in which there are a large number of fatalities is not only the problem of the health sector: other actors such as government institutions, NGOs, local authorities, and the community itself are involved. The most immediate general measures that help to create a climate of order and emotional calm include following:

- ◆ Ensure a correct and orderly response on the part of the authorities;
- ◆ Provide truthful and timely information;
- ◆ Encourage inter-institutional cooperation and community participation;
- ◆ Guarantee basic health service and prioritize psychosocial care for survivors;

- ◆ Provide priority care to the most vulnerable groups, taking into account gender and age differences;
- ◆ Anticipate an increased number of people with manifestations of unresolved grief or psychiatric disorders, and facilitate adequate care for them;
- ◆ Ensure the careful and ethical handling of corpses by emergency response teams;
- ◆ Establish a clear, orderly, and individualized approach to giving notification of deaths and disappearances;
- ◆ Avoid mass burials or burial in common graves. Support the identification and registration of corpses, as well as delivery of corpses to family members so that the desires and the customs of the families are respected.

Traumatic experiences as well as losses and grief necessarily take on different forms of expression according to the culture. The predominant concepts about life and death and performing funeral rites for loved ones are important for the process of acceptance and understanding of what has occurred.

Delayed effects from disaster situations with large numbers of fatalities should be taken into account, with a view to designing appropriate intervention strategies for their prevention and effective control. However, the most frequent institutional response is based on individual psychiatric care, and serves only a small number of the affected population.

In situations where massacres have taken place, the need for medium- and long-term measures to repair the social fabric should be emphasized. These measures include:

- ◆ Restitution (material and indemnity);
- ◆ Humanitarian assistance and respect of human rights of the survivors;
- ◆ Recovery of the collective memory and dignity of the victims;
- ◆ Exhumations that can contribute to explaining the events and assist the grieving process of the family and community;
- ◆ Active role of different actors (state and civil society);
- ◆ Promotion of peaceful coexistence;
- ◆ Social and political changes that contribute to general well-being and strengthened peace and democracy.

Many countries of our region have been affected historically by multiple traumatic events such as armed conflicts and natural disasters, in a context of substantial socioeconomic misfortune. The human and material losses have been enormous; we are obliged to assist with the psychosocial recovery of these populations in the framework of comprehensive health services, and this obligation should be recognized in policies of the State.

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CHAPTER 6: LEGAL ASPECTS

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The inability to identify human remains has important economic and moral consequences for the families of the deceased and ultimately, for the State. It is especially harmful when procedures that are generally sanctioned in domestic law are disregarded, including: correct removal of remains; the preparation of identification files that can preserve at least a minimum of information about the deceased; and the final, individualized disposal of the remains, always maintaining the chain of custody. The failure to follow these procedures can generate State responsibility with regard to the relatives of the victims, as well as to others who have a legitimate interest in certifying a person's death.

INTRODUCTION

Death is an event that creates legal consequences with a profound effect on the life of the survivors, in emotional, economic, and familial aspects. Uncertainty about the survival of those who were at the site of a natural disaster is something that should and can be avoided through proper management of human remains.

The objective of this chapter is to describe existing legislation in the countries of the Region of the Americas about management of corpses and missing persons, and to point out the legal consequences of not identifying bodies. From the analysis of domestic and international legislation it can be concluded that it is a duty of the State to recover the corpses, to remove them correctly, to identify them, and, in the event that this is not possible, to collect the data necessary to accomplish identification in the future by preparing identification files. Moreover, religious and funeral rituals observed by the family of the deceased or by the community where an event occurs should be respected at all times. Corpses should be buried individually, and a detailed report should be maintained in the identification file indicating the exact location of the burial.

A model law for managing dead bodies, which addresses the above issues, is presented at the end of this chapter

GENERAL REGULATIONS ON MANAGING CORPSES

The civil codes of the Region define physical persons as entities who are able to acquire or hold rights and to contract obligations. Death puts an end to the person, and for this reason is an event of great importance that has fundamental legal and

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inheritance consequences.¹ Among these we should emphasize the transfer of possessions of the deceased to his or her heirs, and the dissolution of marriage with the consequence that the surviving spouse can remarry.

Given the importance of the death of a person as a legal event, States have regulated processes related to the confirmation of death, determination of the exact time of death, measures used to identify the decedent, establishment of causes and manner of the death, and documentation and proof of the same. Moreover, there are regulations on the processes of declaring the presumed death of people who are missing.

The documented proof of the death of a person is known as the death certificate. It is an instrument that contains the name of the victim, the age, sex, causes of death, hour and date of death, the name of the professional who established the diagnosis and signed the certificate, and the place and date that the certificate is issued.² Death certificates should be recorded in registries that maintain the vital statistics of the population. Thus, the death certificate and its registration are essential requirements for legal and inheritance processes to advance at the time of someone's death.

Unidentified Bodies

The appearance of unidentified bodies occurs regardless of whether or not there are emergencies or catastrophes, and for this reason they are taken into account in the law. In this regard, the countries of the Region have established norms for: removal of corpses, transfer to a morgue, identification, establishing the cause of death, and delivery of the corpse to family members or other arrangements in the event that no one claims them.³

When the existence of dead bodies is reported, authorities are interested in whether or not a crime has been committed.⁴ It is usually necessary to follow a series of regulations for removal of the body, which are generally described in the penal procedures codes. These usually include inspection of the site, a preliminary examination of the body, collection of possible evidence, and photographing the scene, among others. The purpose is to collect the greatest amount of potential evidence that can help determine the cause of death and establish the identity of the body.

The body is then sent to the morgue so that an autopsy can be performed. All of the legal provisions that we have analyzed concur that in the case of unidentified corpses (usually designated as “NN” or “John/Jane Doe”), morgue personnel should complete an identification file that includes the description of physical characteristics of the corpse such as approximate age, sex, and racial features, among others.

¹ At death, one is no longer considered a person, that is, a subject of the law. Thus, cadavers are regarded, in general, as “things.” This classification might be deemed inappropriate since cadavers are not subject to common rules about possessions and property, and, for that reason, they are not a “thing” in the legal sense of the word. So despite their indefinite legal status which, on occasion prevents their protection in the framework of the law in force, human remains have been the object of normative protection, as will be discussed later in this chapter.

² All countries of the Region have laws that address in detail the registration and issuance of death certificates. For example, Decree No. 722 of Nicaragua, published on 12 May 1981; the Lei dos Registros Públicos (Public Registry Law) No. 6.015/73 of Brazil; or the Ley del Registro Demográfico (Demographic Registry Law) No. 24 of Puerto Rico, published in 1931.

³ There are a variety of regulations that address this topic: health codes or regulations [for example, Law No. 26.842 of 1997, the Ley General de Salud (General Health Law) from Peru]; regulations that classify the departments of legal or forensic medicine; instructions that regulate the operation of morgues; codes for criminal proceedings (for example, in Colombia, Articles 290 and 291 of Law No. 600, published in 2000); or regulations for the forensic medical corps [for example, Código de Instrucción Médico Forense (Medical Forensic Instruction Code) of Venezuela].

⁴ For example, the Código Procesal Penal (Penal Procedure Code), Article 177, of Paraguay; the Código Procesal Penal, Articles 85-90, of Chile; and the Código Procesal Penal, Article 239, of Peru.

Photographs should be made, a dental chart prepared, fingerprints taken, tissue and other samples taken for DNA or other testing, and any other samples needed to proceed with future identification.

The corpses tend to remain in the morgue as long as the morgue has the capacity, or for a specified period of time, which varies depending on the regulations. The bodies are then buried either in individual or collective graves, but always maintaining certain spaces between the bodies in order to preserve the individuality of the dead. The exact site of the burial of each body should be adequately marked.

These procedures make it possible to establish what is usually called the “chain of custody” for the corpse, meaning the preservation of clear documentation relating the identification file created in the morgue and the exact site of burial, so that once identified, the corpse can be exhumed and delivered to family members.

Laws regulating the activity of cemeteries generally address burial or cremation of remains.⁵ In this regard, personnel in charge of the cemetery can only bury bodies from the morgue when there are certificates or documents, generally issued by health departments, which authorize the burial. Normally special sections of the cemetery are designated for the burial of unidentified corpses.

These standards also regulate the conditions in which it is possible to cremate or incinerate the bodies. The principle is that cremation of remains cannot take place when the cause of death has not been established; in the event that there is no doubt about the cause of death, cremation cannot be performed without the authorization of the relatives of the deceased. This last condition makes cremation of unidentified corpses impossible. The exception to this principle, according to legal texts, is when the dead body could cause the spread of disease, which is defined in some regulations as “pestilent or epidemic”, although the majority of regulations refer generically to “cases in which the corpses make the spread of diseases possible.”⁶ Accordingly, this legal exclusion would not apply to the traumatic deaths presumed to be a consequence of natural disasters, since, as discussed in Chapter 3 of this manual (“Health Considerations”), dead bodies do not pose a major health threat in these conditions.

Missing Persons

Thus far we have analyzed provisions that apply to situations in which there exists a corpse and it may or may not be possible to identify it. In cases of a missing person, that is, when there has been no news of him or her for a certain period of time, regardless of the circumstances of the disappearance, the law has implemented a series of procedures used to resolve the uncertainty and legal consequences of the disappearance.

When a person disappears, family members are faced with an ambiguous and very complex situation which transcends the emotional aspects of the loss. In principle, no

⁵ By way of example we can mention the following: Decree No. 22.183-S of Costa Rica, published on 18 May 1973; Decree No. 1.537 of Nicaragua, published on 28 December 1984; Acuerdo Gubernamental (Governmental Resolution) No. 5 of Guatemala, published on 10 January 1996; Decreto Supremo (Supreme Decree) No. 03-94-SA of Peru, published on 12 October 1994; Resolution No. 27 of Paraguay, published on 3 January 1986; Reglamento de Cementerios del Distrito Federal de México (Cemetery Regulations of the Federal District of Mexico), published on 28 December 1984; the Health Service Act of the Bahamas, Chapter No. 215; the Revised Laws (1965) and Public Health Act of Belize, Chapter 31, Section III, Revised SL 1962.

⁶ Ordinance No. 27.590 of the city of Buenos Aires, published on 14 May 1973.

⁷ For example, Law No. 26.842, published in 1997 in Peru's Ley General de Salud (General Health Law), Article 112, and others mentioned in footnote 5.

one can be considered dead until a death certificate is issued, which leads to major economic consequences. There are many cases of families who remain completely unprotected: they are unable to access family assets (banking accounts or pension funds, for example), they cannot receive property that is in the name of the missing person, or they are prevented from collecting life insurance or reparations. In addition, a significant number of people outside of the family can be affected by the disappearance, including business partners, debtors, and creditors, among others.

There have been legal ordinances to resolve such situations since ancient times. The civil codes of the Region, which, in general, date to the end of the nineteenth and beginning of the twentieth century, address the declaration of the presumption of death or declaration of presumed death.⁸ By providing for a declaration that the missing person is presumed dead, these instruments allow for the same legal processes as those affecting confirmed deaths.

In this regard, the family members and others who have a legitimate interest can make a legal request for a declaration of presumed death of the missing person under certain circumstances (for example, accidents or disappearance of boats or aircraft, earthquakes or other catastrophic events, or military actions or war). It is a legal requirement for a reasonable amount of time to elapse following the time of the event in order to avoid fraud. The process concludes with the declaration of presumed death of the missing person and the date of presumed death. The finding is usually entered into civil or personal registries so that the death is accredited for legal purposes. The codes also regulate matters relating to the reappearance of the person who is presumed dead.⁹

However, this process is long and expensive for the family. The waiting period that must elapse added to the time needed for the judicial process itself, means that the family of the victim must exist for an extended time without the income that the deceased provided and without receiving one's inheritance. In addition, professional fees must be paid to the lawyers involved, notices published in daily newspapers, and other expensive arrangements made.

In order to avoid the cumbersome processes described in the civil codes, and when there is an event that generates large numbers of victims in which survival is unlikely, the authorities have resorted to exceptional remedies, as described below.

In El Salvador, following the earthquake on 13 January 2001, the Legislative Assembly approved Decree No. 294 on 23 February 2002, sanctioning a special, temporary law in order to certify the deaths of those killed or missing because of the disaster. The regulation was enacted because authorities could not make legal identifications of a large number of people who were killed when buried in rubble, or whose whereabouts were unknown. The law was passed because of the difficulty of complying with standard legal procedures for establishing the status of missing persons.

⁸ For example, the Civil Code of Argentina, Articles 110 to 125; Civil Code of Bolivia, Articles 39 to 51; Civil Code of Brazil, Articles 6 to 10; Civil Code of Paraguay, Articles 63 to 72; and the Civil Code of Chile, Articles 80 to 94.

⁹ In general, if the person who is presumed dead reappears, his or her marriage contract is considered to be valid; but if the surviving spouse has entered into a new marriage, it is not annulled. The person is entitled to recover property that still exists in the condition in which it is found, and recover the net proceeds of missing property.

In the United States, an average of three years must elapse before obtaining a judicial ruling on the presumed death of a person who is missing due to accidents or catastrophic events. The City and State of New York adopted special procedures as a consequence of the terrorist attack of 11 September 2001 (Helping Handbook, 2001). The process took between one and two weeks from the time that the missing persons report was filed at the New York City Police Department by the closest relative of the missing person. The request had to be accompanied with a series of requirements such as proof of relationship, a sworn statement with detailed information about the missing family member, the basis for the belief that the missing person was at the World Trade Center on September 11, and other issues. In this case it was expressly stated that acquiring a death certificate would not affect the attempts being made to find survivors or to identify remains found at the World Trade Center.¹⁰

In other cases, civil code procedures have undergone continual modification to conform to the needs of the victims' relatives.

A landslide in the Mameyes district of the city of Ponce, Puerto Rico, occurred on 7 October 1985, resulting in the deaths of dozens of people whose bodies could never be recovered or identified. In response, Law No. 1, of 12 December 1985, was passed to establish special procedures for such situations. They are based on the preparation of an investigative action by the Public Ministry containing a census of the missing people on the day or days of a catastrophic event. The Public Ministry has 45 days to prepare the proceedings and present them to the corresponding court together with a petition declaring the deaths of the people included in the census. Once the ruling is made, the Secretary of Health issues corresponding death certificates for the people whose deaths are decreed by the court.

In Spain, Law No. 4 was approved in 2000; it modifies Civil Code statutes on the declaration of death of those missing in shipwrecks and disasters. The law shortens the time required before proceeding with a declaration of death in cases of imminent threat of death because of violence, shipwreck, disappearance of a ship, or aircraft disasters.

The above examples show that legal codes have attempted to resolve the problem of missing persons by resorting to a legal fiction: that is, presuming the deaths of persons who have disappeared in given circumstances. This, without a doubt, helps to solve many practical problems relating to legal and estate issues, but it should be made clear that these procedures cannot be used to replace or justify the ineffectiveness of the authorities with regard to proceeding in the identification of dead bodies. The special and temporary statutes that declare the missing as presumed dead because of a natural disaster should be used only when corpse recovery is impossible because

¹⁰ The text of the Helping Handbook can be viewed at: www.mofo.com/about/pbhandbook/handbook/about.htm.

of the nature of the disaster. The assets that are recovered because of these expedited procedures can never replace the certain identification of a body, which is the only thing that can put an end to the agony of family members with respect to the fates of their loved ones.

When recovery of dead bodies has been deemed impossible, in general because they were buried by landslides, building collapse, or other similar circumstances, the authorities have in some cases resorted to declaring the disaster zone “sacred ground,” frequently in response to the request of family members. We have not had access to the text of these pronouncements, so their exact scope is not clear. We should mention, however, that cemeteries are considered sacred places out of respect for the dead, and are intangible property in the sense that they are exempt from property claims, etc.

The declaration of “sacred ground” can be problematic in the sense that the site of the tragedy could be private property or subject to economic exploitation. Such a conflict arose in the mining camp of Chima, Bolivia, where in March 2003 a landslide buried some 20 houses and caused a high number of deaths. Because it was impossible to recover the bodies, the residents asked the authorities to declare the area “sacred ground.” This was met by immediate opposition from the cooperative in charge of the mining concession because, given the sacred nature of the site, gold mining there would have to end (Diario La Prensa, 3 April 2003, La Paz, Bolivia).

It should be emphasized, however, that identification should be the objective of the authorities, and that recovery of dead bodies is the basic premise of identification. Everything possible should be done to recover the bodies, following the criteria outlined in Chapter 2 (“Medicolegal Work in Disasters”), in order to preserve evidence that can help with identification. Only when all attempts at recovering the remains have been exhausted can the option of declaring the disaster site, where the corpses remain, as sacred ground. While this does not resolve the identification problem, it can help the grieving process and psychological recovery of families and the population at large by providing a place for honoring and remembering the dead.

IDENTIFICATION OF NUMEROUS CORPSES

From what has been discussed above, it is clear that the law has dealt with matters relative to corpse recovery, identification, and burial, but we have not found statutes for cases in which a large number of fatalities are presented as a consequence of natural disasters. The only reference in legal codes in this regard relates to resolving the legal status of missing persons in various circumstances, including natural disasters.

In principle, therefore, there would be no reason not to act in accordance with the domestic statutes mentioned above when natural events cause massive fatalities. This

involves recovery of the body, preparation of an identification file, individual burial of the corpse, and maintenance of the chain of custody that would permit potential exhumation at some point in the future.

This assumption does not imply that we can ignore what is involved in managing a large number of fatalities. In general, when a major natural disaster occurs, there is no doubt about the cause of death, and consequently no suspicion that a crime has been committed. This would seem to influence the fact that in the process of corpse removal at disaster sites, other elements at the scene are not preserved. Moreover, it is common to act quickly because of pressure exerted by relatives and, sometimes, because of unfounded beliefs about the health hazards presented by dead bodies. Nevertheless, the recovery of corpses and preservation of as much data as possible, considering the emergency circumstances and other priorities, should be performed with the greatest possible diligence. This facilitates the process of identification, and determining identity should be as important for the authorities as determining the causes of death.

We cannot ignore the fact that a major natural disaster can produce hundreds of fatalities that clearly overwhelm the infrastructure established for managing dead bodies in normal circumstances. However, we should emphasize that identification of corpses is a technical matter that can be carried out regardless of the number if the authorities follow procedures described in Chapter 2. The following section analyzes the legal consequences of procedures that prevent identification of corpses.

Because many types of resources are required when there are a large number of corpses to identify, it is necessary to lay the groundwork for effective collaboration among countries. This can be done using existing cooperation agreements regarding disasters, or more concretely through the system established by Interpol, which will be addressed later.

CONSEQUENCES OF FAILURE TO IDENTIFY CORPSES

The inability to identify human remains results in economic and moral injury to families of the victim. This is due to a lack of regard for the procedures generally sanctioned by domestic legislation regarding: (a) the proper removal of the corpses, (b) creation of identification files which, at least, preserve a minimum amount of information depending on circumstances of the emergency, and (c) individualized disposal of the corpse thereby maintaining the chain of custody. This failure can make the State responsible respect to the relatives of the victims and ultimately other persons with a legitimate interest in certification of the death.

Provisions of national law

Authorities have a fundamental interest in management of dead bodies, which is expressed by a series of obligations that are listed below:

- ◆ The State has the obligation to structure its civil defense in order to protect its citizens. So the State is responsible, through its authorities designated for emergency management, for disaster prevention and operations of rescue, relief, rehabilitation, and reconstruction. In this framework, priorities of the authorities immediately following a disaster event are: first, rescue and assistance for survivors; second, repair and maintenance of basic services; and finally, recovery and management of dead bodies.
- ◆ States have legislation and internal procedures regarding the identification and disposal of dead bodies. All the States have departments of legal or forensic medicine in charge of corpse identification and autopsy, and have custody of the bodies until they are transferred to the cemeteries.
- ◆ The State has a clear obligation to have health officers oversee everything relative to the operation of the cemeteries, burials, exhumations, and other related issues. Furthermore, it rules on the transfer of corpses within the country and internationally, which is carried out under strict control of health authorities. It is also the responsibility of the State to establish standards for, and control the registration and release of death certificates, and to organize and administer the population's civil registries in order to prevent fraud.
- ◆ The State upholds respect for the integrity of corpses through various regulations. The penal codes of the region sanction punishment for the desecration of graves, corpses, or ashes and, in some cases, the interruption of funerals and necrophilia.¹¹ Legal protection, which varies in different jurisdictions, considers crimes against religious freedom, against marital status, and even, as in the case of Puerto Rico, crimes against the respect due to the dead.
- ◆ In a similar vein, there are different standards in the Region about organ transplantation from donors. Several of them stipulate that the corpse of the donor should receive respectful and dignified treatment, and that the physical integrity of an unidentified corpse from which organs are removed should be respected.¹²
- ◆ The State has the duty to protect those fundamental human rights that are consecrated in the constitutions of countries, such as the rights to physical and moral integrity of individuals,¹³ religious freedom,¹⁴ and respect for the customs of indigenous peoples.¹⁵ These rights can be violated if the authorities in

¹¹ For example, the Penal Code of Puerto Rico in the sections on crimes against respect of the dead and crimes against the family, and articles 140 and 141, describe the crimes of desecration of cadavers or ashes, the gravesite, or an interruption of the funeral. These crimes are defined in the Penal Code of Venezuela in articles 171-173 in the section on crimes against freedom of worship. Chapter V of the Penal Code of Nicaragua includes the desecration of graves and of cadavers among the crimes affecting civil status. The Penal Code of Uruguay, in articles 307 to 308 and in the section on crimes against freedom of worship, addresses the crimes of vilification of cadavers, ashes, graves, and urns, or theft of cadavers. The Penal Codes of various Mexican states punish the desecration of graves and acts of necrophilia (e.g., the States of Aguas Calientes and Baja California).

¹² For example, Argentina's Law 24.193 of 1993, article 25; and Uruguay's Law 14.005, Article 8.

¹³ These rights are codified in Article 12 of the Constitution of Bolivia, Article 1 of the Constitution of Chile, Article 23 of the Constitution of Ecuador, Article 2 of the Constitution of Peru, Article 36 of the Constitution of Nicaragua, Article 4 of the Constitution of Paraguay, Article 8 of the Constitution of the Dominican Republic, and Article 46 of the Constitution of Venezuela. It is implicit in these codes that the right to physical integrity cannot be defined as the right to life, understood not as the right to existence but as the right not to suffer damages in any of its basic manifestations. For example, the Constitution of Colombia does not expressly sanction the right to physical integrity, but the Constitutional Court has ruled (Case T-584/98) that the right to life entails, by extension, the right to physical and moral integrity as well as the right to health.

¹⁴ Freedom of conscience and religion are expressed in: Article 3 of the Constitution of Bolivia, Article 19 of the Constitution of Chile, Articles 18 and 19 of the Constitution of Colombia, Article 23 of the Constitution of Ecuador, Article 2 of the Constitution of Peru, and Articles 59 and 61 of the Constitution of Venezuela.

¹⁵ Protection of the indigenous villages or communities is addressed by the countries of the Region through specific protective statutes.

charge of emergency management refuse to recover the corpses; remove it improperly; if they are careless when identifying them; or if they disregard religious rituals and cultural beliefs when burying the remains.

According to what has been outlined above, such actions can justify the right of family members or those persons with a legitimate interest in explanation of a disappearance, to pursue legal action for reparations of damages. The material injury results from the inability of family members or interested parties to access family assets, to collect insurance, and to take possession of the property of the deceased, which depends on lengthy processes for there to be a declaration of presumed death. The moral or psychological injury derives from several aspects explained in detail in Chapter 5 (“Psychological Aspects”), and is based on uncertainty about the actual death and the inability of relatives to bury their loved ones, which hinders and delays the grieving process.

With regard to burial of remains in common graves, it is worth stating that this makes the process of identification enormously difficult. It eventually becomes a much more expensive and complicated forensic anthropological task. Furthermore, these practices, including cremation of corpses, jeopardize social traditions about respect for the dead and tend to be in conflict with the religious rites and the cultural norms discussed in Chapter 4 (“Sociocultural Aspects”). This can result in psychological harm for the relatives and lead to legal proceedings and demand for reparations.

From the preventive standpoint, and in accordance with different legal codes, it would be possible to introduce simple denunciations or protective actions for the purpose of forcing the authorities to act appropriately when there is the potential for violation of fundamental rights firmly established in the constitutions of the States.

Following the accident involving a TANS Fokker F-28 aircraft that crashed into the Coloque mountain near the city of Chachapoyas, Peru, in January 2003, the relatives of the dead denounced the supposed “fraudulent and criminal” action of Air Force and other military personnel for hiding information about the real possibilities for recovering the remains of their family members. According to what relatives reported to the press, “they hid the facts and cynically lied about the logistical possibilities for air and land rescue of the bodies of the victims, besides denying that human remains were scattered in the area.” The denunciation was made after the government announced that corpse recovery was impossible because the bodies had disintegrated in the crash. Family members, who rented aircraft to fly over the area, confirmed the presence of human remains.¹⁶ This is a clear example of the pressure that family members can exert by using denunciations to compel authorities to act appropriately when managing corpses.

¹⁶ Press accounts taken from El Expreso, La República, Ojo, Liberación, Pura Verdad y la Razón, 17 January 2003 and from Diario La Razón, 18 January 2002.

Provisions of international law

There are international instruments that address the management of corpses. Although they have different characteristics and scope, they affirm the importance that the international community places on the recovery, identification, and burial of human remains in accordance with religious ritual and cultural beliefs. These documents address the treatment of human remains in different situations; for example, those who die in disasters (Interpol Guides), in armed conflicts (Geneva Conventions and other protocols), natural catastrophes (*Guiding Principles on Internal Displacement*), or aircraft accidents (ICAO Standards).

Guiding Principles on Internal Displacement

The *Guiding Principles on Internal Displacement* were prepared and presented in 1998 by the Representative of the Secretary-General of the United Nations on Internally Displaced Persons, Mr. Francis M. Deng, in response to the mandate of the United Nations General Assembly and the Commission of Human Rights to prepare a legal framework for the protection and assistance of internally displaced persons.

These principles are of fundamental importance to this topic because in defining internally displaced persons, they include “persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of ... natural or human-made disasters, and who have not crossed an internationally recognized State border.”¹⁷

According to these principles, persons displaced by natural catastrophes have “the right to know the fate and whereabouts of missing relatives.” It also states: “The authorities concerned shall endeavour to establish the fate and whereabouts of internally displaced persons reported missing, and cooperate with relevant international organizations engaged in this task. They shall inform the next of kin on the progress of the investigation and notify them of any result... The authorities concerned shall endeavour to collect and identify the mortal remains of those deceased, prevent their despoliation or mutilation, and facilitate the return of those remains to the next of kin or dispose of them respectfully. ...Grave sites of internally displaced persons should be protected and respected in all circumstances.”¹⁸

Although the *Guiding Principles* do not constitute a binding legal document as such, they have achieved recognition and considerable prestige in a relatively short period of time and are distributed and promoted widely by the United Nations. Furthermore, to the extent that they contain a series of provisions that are codified in international human rights law, international humanitarian law, and the analogous rights of refugees, and have been ratified by most States of the Region, they are compulsory in character and should be implemented in good faith by States.¹⁹

¹⁷ *Guiding Principles on Internal Displacement*, Office of the High Commissioner on Human Rights, extract from Document E/CN.4/1998/53/Add.2, dated 11 February 1998. The text of the *Guiding Principles* can be viewed at: www.unhcr.ch/html/menu2/7/b/principles.htm.

¹⁸ Ibid., Principle 16.

¹⁹ “Good faith” is an ethical and legal principle that seeks to ensure seriousness and compliance in obligations assumed through international treaties. It seeks to guarantee security and avoid deceit or pretense in international relations. It is based on compliance with the obligations freely entered into by nations, in accordance with international pacts or treaties (United Nations Charter, Article 2, Para. 2, and Vienna Convention, Article 26).

Interpol's *Disaster Victim Identification Guide*

The International Criminal Police Organization (Interpol) is an international agency with 181 Member States that include the majority of States in the Region of the Americas. Its objectives are defined in Article 2 of its Constitution, which are: “to ensure and promote the widest possible mutual assistance between all criminal police authorities within the limits of the laws existing in the different countries and in the spirit of the Universal Declaration of Human Rights; …” and “to establish and develop all institutions likely to contribute effectively to the prevention and suppression of ordinary law crimes.”²⁰

For several years, Interpol has sponsored a program of activities related to the identification of disaster victims; the objective of this program is to encourage the Member Countries to adopt a common policy in this field. For this purpose it prepared the *Disaster Victim Identification Guide* (referred to here as the “Guide”), published for the first time in 1984 as a result of the work of the Standing Committee on Disaster Victim Identification, which has met annually since 1993 in order to update procedures that are used in this field.²¹

The Guide includes recommendations for Member States that emphasize the importance of planning and training for identification of human remains. Its preparation was based on practical experiences, and is applicable to any type of disaster situation, regardless of the number of deaths. It is useful in situations where persons from other Member Countries are found as victims at a disaster site.

At its 49th General Assembly, held in Manila in 1980, Interpol adopted a resolution with recommendations directed to the Member States on the identification of victims of disasters.²² This resolution recognizes the basic human right of individuals to be properly identified after death, and the international importance of identification with regard to police investigations and religious and cultural matters. It recommends that Member Countries use the Guide and Interpol forms for identification, regardless of the number of victims of a disaster. Furthermore, it describes the obligations of the Standing Committee for the Identification of Victims of Catastrophes and recommends that Member States establish disaster victim identification teams comprising police officers, forensic pathologists, and forensic odontologists, or, at least, appoint responsible officers who should be the main contacts in their own countries when their citizens are involved in a disaster, or when requested to assist another country.

The *Disaster Victim Identification Guide* has several chapters. Chapter 1 explains that corpse identification is a difficult task that can only be concluded successfully with adequate planning and the interaction of several institutions. Chapter 2 addresses general considerations about disaster management, and Chapter 3 explains identification methods and reasons for involving several groups of specialists in the operation. Chapter 4 describes the three major stages in victim identification, namely: search for ante-mortem information for possible victims; recovery and examination of bodies to establish post-mortem evidence from the deceased; and comparison of

²⁰ The list of Member States, the Constitution and other institutional information about Interpol can be viewed at www.interpol.int.

²¹ The complete text and forms of the Disaster Victim Identification Guide can be viewed at www.interpol.int/Public/DisasterVictim/Guide/Default.asp.

²² Resolution AGN/65.RES.13.

ante-mortem and post-mortem data. Chapter 5 presents a series of forms used to collect data by elimination; these can be used by member countries to facilitate the manual (that is, not computerized) comparison of data. Chapter 6 refers to the liaison between countries after a disaster or during the response planning phases, and includes references to international law, regulations, and agreements. In this chapter, Interpol recommends that because there are no international agreements on cooperation for disaster victim identification, member countries should look at the possibility of their own identification experts traveling to the country in which an incident has occurred when their citizens may be victims. The Guide gives recommendations on how to manage the assignment of such personnel.

The Interpol Guide is the only international instrument found that specifically addresses concrete disaster victim identification techniques in disaster conditions. They are not mandatory but are presented as recommendations, and it depends on the will and desire of Member States or of an organization to adopt them. However, the recommendations are of fundamental value in that they expressly recognize the basic right of individuals to be identified after death. They also lay the groundwork for cooperation among countries, not only so contact teams can be established to identify foreign victims in the country affected, but so that groups trained in identification can travel to other countries to provide assistance.

Geneva Conventions and other protocols: principles of international humanitarian law

International humanitarian law, also known as the law of war, or the law of armed conflict, is a set of rules which seeks, during armed conflict, to protect persons who are not or are no longer participating in the hostilities, and to limit methods of warfare.

Within this framework, international humanitarian law addresses the handling of corpses including aspects on search, identification, and final disposal of human remains resulting from armed conflict. The latter is addressed in the Law of the Hague of 1899 and 1907, the four Geneva Conventions of 1949, Protocols I and II (1977) to the Geneva Conventions, and the rights embodied in customs or generally practiced law.²³

The principles that address handling of dead bodies in accordance with international humanitarian law, including binding and non-binding laws, are summarized in the following (International Committee of the Red Cross, 2003):²⁴

- ◆ All the parties in an armed conflict: "...should, without delay, take all possible measures to seek and collect the dead, without distinction, and have to treat them with respect and dignity avoiding the plunder and the dispossession of the same."

²³ To see the complete texts of the Conventions, visit the web site of the International Committee of the Red Cross (ICRC): www.icrc.org.

²⁴ These principles have been extracted from Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field, Geneva, 12 August 1949, articles 15 to 17; Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea, Geneva, 12 August 1949, articles 18 to 21; Convention (III) relative to the Treatment of Prisoners of War, Geneva, 12 August 1949, articles 120 and 121; Convention (IV) relative to the Protection of Civilian Persons in Time of War, Geneva, 12 August 1949; articles 129 to 131; Protocol (I) Additional to the Geneva Conventions and relating to the Protection of Victims of International Armed Conflicts, 8 June 1977, articles 32 to 34; and Protocol (II) Additional to the Geneva Conventions and relating to the Protection of Victims of Non-International Armed Conflicts, 8 June 1977, article 8.

- ◆ All the parties in an armed conflict should take measures to identify the dead before burying them or burning them. The Conventions also state: "...Parties to the conflict shall ensure that burial or cremation of the dead, carried out individually as far as circumstances permit, is preceded by a careful examination, if possible by a medical examination, of the bodies, with a view to confirming death, establishing identity and enabling a report to be made."
- ◆ "...Bodies shall not be cremated except for imperative reasons of hygiene or for motives based on the religion of the deceased. In case of cremation, the circumstances and reasons for cremation shall be stated in detail in the death certificate or on the authenticated list of the dead." In an armed conflict it is necessary to bury or to burn honorably the dead and to respect their graves. The people whose fatal remains cannot be delivered to their family members in an armed conflict will be buried individually. All the graves will be marked. Only exceptionally will collective graves be utilized.
- ◆ "All the parties in an armed conflict have to do everything possible to provide information on the identity, the location, and the cause of the death of the deceased to the responsible authorities or to their relatives."

The standards mentioned above, that should be respected by the signatory states of the Conventions of Geneva and its Additional Protocols,²⁵ are probably the oldest provisions regarding management of human remains although they apply to international and domestic armed conflict situations and not to natural disasters. In armed conflicts there are belligerent parties that cause a large number of the fatalities, and it is in their hands to stop fighting or declare a truce in order to collect the bodies, identify them, and to bury them with dignity and respect. These are, however, very valuable principles because they expressly recognize the importance of prioritizing identification of the dead as a fundamental right.

Provisions of the International Civil Aviation Organization (ICAO)

When aviation accidents occur—events that tend to produce a significant number of fatalities—there are various sectors interested in the recovery and identification of the dead. First, are the airline companies, who are pressured by relatives of the victims and have a basic interest in establishing the cause of the accident. Then there are insurance companies that must pay high sums of money to relatives of the dead. Finally, there are the state entities in charge of civil aviation control, whose basic objective is the investigation of the circumstances surrounding the accident to prevent similar events from occurring in the future.²⁶

This has led to the creation of regulations for investigating aviation accidents which include, as part of the investigation, the requirement of identifying corpses. At the national level, these standards are usually included in aeronautic laws and codes, and at the international level, they are found in recommendations made by the International Civil Aviation Organization (ICAO).

²⁵ For more information about implementation of international humanitarian law at the local level, consult the document and commentaries database on the web site of the International Committee of the Red Cross: www.icrc.org/ihl-nat.

²⁶ In practice, when there is an international aviation accident, teams responsible for handling cadavers are dispatched immediately to the disaster site. They perform very efficiently and, in general, cooperate with local authorities in the removal of corpses.

The ICAO, the international regulatory organization for civil aviation, fulfills a key role in investigative tasks in the event of international accidents of civil aircraft (that is, aircraft not belonging to a State).²⁷ National regulations that generally coincide with those of the ICAO are applied in accidents involving domestic aircraft that occur in national territory.

The Convention on International Civil Aviation, which created the ICAO, states in Article 26 that in the event of an accident that causes death or serious injury, or indicates serious technical defects in the aircraft or in navigational facilities or services, the State where the accident occurs will open an inquiry about the circumstances of the accident in accordance with the procedures recommended by the ICAO, to the extent that State regulations allow.

For the purpose of establishing the procedures to carry on research, the Council of the ICAO adopted on 11 April 1951 the International Standards and Recommended Practices for Aircraft Accident and Incident Investigations, designated as “Annex 13 to the Agreement.”²⁸ The latter contains recommendations on the standards and the methods for conducting investigations, providing for uniformity among Member States in the process. Chapter IV on notification, establishes that the State where the event occurs should send as quickly as possible to the State of registry, the State of the operator, and the State of manufacture, information about, among other issues, the number of crew and passengers on board, and the dead and critically wounded (Section 5.2, paragraph H). Moreover, it establishes that “the only objective of accident or incident investigations will be the prevention of future accidents and incidents” and that “the purpose of this activity is not to assign blame or responsibility.”

Other relevant ICAO documents are the *Manual of Aircraft Accident Investigation* (Document 6920-AN 855/4) and the *Manual on Accident/Incident Reporting* (Document 9156-AN/900). Particularly, the *Manual of Aircraft Accident Investigation*, in reference to medical investigation, establishes that the object is to provide technically useful medical information so that the investigator in charge can reconstruct the accident to obtain data relating to ergonomic engineering, aspects of survival, etc., and to coordinate this information with the civil authorities to carry out legal identification of the victims, to certify deaths, and perform related activities.

International instruments on human rights: right of corpses to be identified and buried respecting the religious rites and cultural beliefs after catastrophic events of natural origin

Unlike the aforementioned documents, which in one way or another make reference to the management of corpses, international instruments on human rights do not expressly mention the rights of the relatives of victims of a natural disaster to demand that emergency management authorities recover and identify the victims and bury them in accordance with the religious rites and cultural beliefs of the victim or of the place where the disaster occurred. This does not rule out the existence of such a right,

²⁷ The ICAO was created by the Convention on International Civil Aviation in Chicago on 7 December 1944. More information and documents can be viewed at the ICAO web site: www.icao.int.

²⁸ Over time, Annex 13 to the ICAO Convention has undergone numerous changes; the tenth revision, adopted on 26 February 2001 and put into effect as of 1 November 2001 is currently in force. With the inclusion of this amendment, the ninth edition of the Annex has been published and is now titled “Investigation of Aviation Accidents and Incidents.”

since many human rights are based on the interpretation of firmly established rights. For example, the rights to truth or the right of persons not to be excluded from the legal order were prepared on the basis of the rights to life, freedom, and personal safety, among others.

In this context, it can be stated that family members of people missing as a consequence of natural disasters, have the right for the remains of their loved ones to be recovered, identified, and buried, respecting religious rites and cultural beliefs. This right has been specifically recognized in the international instruments already referenced, and derives from the joint interpretation of protected human rights, as we attempt to demonstrate in the next section.

Rights established by the American Convention on Human Rights²⁹

Right to physical, mental, and moral integrity

Article 5 of the American Convention on Human Rights establishes that “Every person has the right to have his physical, mental, and moral integrity respected...” (OAS, 2003).³⁰ Regarding the meaning and scope of this right and the way it is applied to the issue of handling the dead, it is necessary to refer to what the Inter-American Court of Human Rights expressed when analyzing a possible violation of Article 5 in the context of forced disappearance of persons:³¹

- ◆ “The anguish and uncertainty that the disappearance and lack of information about the whereabouts of the victim caused his next of kin, resulted in non-pecuniary damage.”
- ◆ “It attends to the family members the right to know where to find the mortal remains of their loved one. This represents a just expectation that the State should fulfill with the means available.”
- ◆ “The continued denial of the truth about the fate of a disappeared person is a form of cruel, inhuman, and degrading treatment for the close family. The right to the truth has been developed sufficiently in international human rights law. As this Court has maintained on previous occasions, the right of the victim’s next of kin to know what has happened to him, and, when appropriate, where the mortal remains are, constitute a measure of reparation and, therefore, an expectation that the State should satisfy for the next of kin and society as a whole.”

29 The American Convention on Human Rights and the American Declaration of the Rights and Duties of Man, along with other instruments and institutions developed by the initiative of the Organization of American States (OAS) to promote and protect human rights, comprise the so-called Inter-American System of Promotion and Protection of Human Rights. The victim of a violation of the rights established in the Convention can petition the Inter-American Commission on Human Rights once having exhausted domestic recourse. If the Commission declares the case to be admissible, they prepare a report on their conclusions according to Article 50 of the Convention and can publish the same or present it to the Inter-American Court on Human Rights for their consideration should the accused State accept the judgment of the Commission. The Inter-American System of Protection of Human Rights allows the Commission to deliberate on cases in which the accused State, being an OAS member, might not have ratified the American Convention. This is due to the fact that, according to the Charter of Organization, the Commission is a permanent organ of the OAS, and its jurisdiction extends to all members as a principle established in the American Declaration of the Rights and Obligations of Man.

30 The complete text of the Convention can be accessed at: www.cidh.org/Basicos/basic3.htm.

31 Trujillo-Oroza Case, “Reparations, Judgment of 27 February 2002,” paragraphs 88, 113, 114, and 115. A similar situation was presented in the Caracazo case, “Reparations, Judgment of 29 August 2002, Series C no. 95, paragraphs 121-125.” See complete texts of judgments at the web site of the Inter-American Court of Human Rights: www.corteidh.or.cr.

- ◆ “It is an act of justice to know the whereabouts of the disappeared person and it is a form of reparation because it allows the victims to be honored, since the mortal remains of a person merit being treated with respect by their relatives, and so that the latter can bury them appropriately.”

In a similar case the Court established:

“...Furthermore, the incineration of the mortal remains of Mr. Nicholas Blake in order to destroy every trace that could reveal his whereabouts, threatens the prevailing cultural values transmitted from generation to generation in Guatemalan society concerning respect for the dead. The incineration of the mortal remains of the victim, ordered by a member of the Guatemalan army, and carried out by civilian patrols, intensified the suffering of the relatives of Mr. Nicholas Blake.”³²

In view of the above judgment, and with the aim of establishing an analogy to cases of forced disappearances that allege violations of Article 5 of the Convention, we should point out that when the authorities do not collect or identify the corpses, and when they incinerate or bury them in common graves, making identification difficult or impossible, those dying as a result of forces of nature become missing persons because of the action or omission of the State with the consequent material and moral harm to the families of the missing person. In other words, the State denies to family members the right to know the fate and whereabouts of their loved ones. This relates directly to the so-called right to the truth, which has been fully elaborated by judgments of the Inter-American Court of Human Rights. Consequently, regardless of the fact that the State could have responsibility in a catastrophe by not preventing the harmful consequences of a natural phenomenon, it is obliged to use all means available to determine whether missing persons are living or dead. The refusal to act generates, without a doubt, intense suffering for the family members and associates of the victims who experience anguish, frustration, and impotence that ultimately affect their moral integrity.

Other violations of rights

With regard to the burial of corpses, authorities should proceed as outlined in Chapter 2 of this manual. If a large number of corpses result from a natural disaster, the remains can be disposed of in collective graves in a way that respects their individuality, ensuring that there are clear instructions about the location of each body and that these are related to the identification file (chain of custody). Practices such as the use of common graves or cremation make identification impossible, besides violating religious and cultural beliefs. This leads to the question of the possible violation of other protected rights, such as freedom of conscience and religion, which are consecrated in Article 12 of the Convention. What the Inter-American Court of Human Rights expressed in the Blake case is very valuable in that it recognized the need for preserving the cultural value of respecting the dead, and that transgression of this results in intensified suffering of the family members.

³² Case of Blake, “Reparations,” Judgment of 22 January 1999, Series C., No. 48, paragraph 115.

Depending on the circumstances, relatives of victims could present petitions relating to violation of Articles 5 (personal integrity), 12 (freedom of conscience and religion), and 1.1 of the American Convention (obligation of the State to respect recognized rights and freedoms).³³

Another aspect that should be considered regarding possible violations of human rights protected by the American Convention is the so-called “states of emergency” that are usually imposed after disaster situations. This concerns the option included in the legal codes of the region, either in their constitutions or in special legislation, which makes it possible to temporarily suspend certain rights in situations of public danger, armed conflict, or disaster. The Commission and the Inter-American Court of Human Rights thoroughly reviewed the topic when creating Article 27 of the American Convention. This article lists a series of rights that cannot be suspended, among which the right to personal integrity is specifically mentioned.

Right to cultural and religious identity, right of indigenous peoples, and right to religious freedom in the International Covenant on Civil and Political Rights and related provisions³⁴

Frequently it is stated that the identification of dead bodies is related to the right to identity, understood as the right that a body be identified after death. However, the concept of the right to identity as a protected human right has evolved in a different sense.

The right to identity has been defined as the “existential interest of each person in not seeing the external or social projection of his or her personality upset, denaturalized, or denied. ...It means that the essential cultural patrimony of the individual, made up by a multiplicity of varied aspects—such as, *inter alia*, identity of origin, family identity, and intellectual, political, religious, social, and professional identity of each person—is not to be argued, distorted, cut short, or denied....” (Apfelbaum, Bracciaforte, and Boye, 1996). This right is recognized in several international human right instruments, such as the Human Rights Declaration (Article 6), the International Covenant on Civil and Political Rights (Article 16) and the Convention on the Rights of the Child (Articles 7 and 8).³⁵

This right has been developed in cases that involve the right of children to have birth certificates or identity documents, international kidnapping or the illegal transfer of children from one country to another, and the right of the children of “disappeared” parent(s) to know his or her true identity. It implies, also, rights to cultural

³³ It is possible to present a case to the Inter-American Commission on Human Rights not only when there are alleged violations of rights protected in the American Convention on Human Rights or the American Declaration on the Rights and Duties of Man, but when a State signatory of the Convention does not comply with statutes established by local legislation (Article 25 of the Convention).

³⁴ The complete text of the International Covenant can be viewed at: www.ohchr.org/english/law/ccpr.htm. The Human Rights Committee is the body responsible for supervising compliance with the standards of the International Covenant on Civil and Political Rights. This is accomplished through reports on the measures that the States parties have adopted to comply with the articles of the Covenant and a system of individual petitions applicable to the States that have ratified the Optional Protocol of the Covenant. This mechanism allows those who believe that a protected right has been violated to enter a petition before the Commission. Once the petition is declared admissible, the Commission examines it and issues a series of “concluding observations” (Article 5, Optional Protocol). These are not obligatory in nature but have important moral value.

³⁵ See the complete texts at the web site of the Library of Human Rights of the University of Minnesota: www1.umn.edu/humanrts/index.html. The American Convention on Human Rights does not expressly sanction the right to identity, but this could be developed based on the right to recognition as a person before the law (Article 3), personal integrity (Article 5) and protection of the family (Article 17).

identity, to religious freedom, and to sexual identity, among other issues. It is this line of reasoning that merits further study.

In this sense, we affirm that the right to identity is related to the right to a burial in accordance with the religious rites and cultural beliefs of the deceased, of their families, or of the place where the catastrophe occurred, if the beliefs of the deceased cannot be established. Also, the authorities in charge of managing the corpses during the stages of removal, identification, and burial of remains, should provide the corpses with dignified treatment in accordance with traditions of respect due to the dead, and to comply with the religious rites or funeral customs that the deceased found at the tragedy site would have followed.

More concretely, violations of these rights could occur with regard to indigenous communities when the authorities in charge of managing the corpses do not respect their traditions. Indigenous communities tend to practice ancestral customs with regard to death that are different from the most popular western religions, and that are intrinsic to their cultures and traditions. These are protected by local statutes and international instruments of human rights in general (International Covenant of Civil and Political Rights, Article 27), and others that apply specifically to indigenous peoples, such as Agreement No. 169 on Indigenous and Tribal Peoples of the International Labour Organization which guarantees the right of the aboriginal peoples to have their own cultural life, to practice their own religion, and to use their own language.

The right to religious freedom is also recognized in several international instruments (for example, Article 12 of the American Convention on Human Rights; Article 13 of the International Covenant on Economic, Social, and Cultural Rites; and Article 18 of the International Covenant on Civil and Political Rights). This right can also be seen to be affected with practices such as cremation of corpses, burial in common graves, or fumigation of human remains in unjustified circumstances as mentioned in Chapter 2 of this manual.

CONCLUSIONS

The countries of the Region of the Americas have taken responsibility for regulating matters relative to the identification and disposition of corpses, as well as resolving the legal situation of missing persons in cases of disasters. We have not located standards that establish exceptions or special regulations regarding the existence of a large number of corpses.

Thus, when natural events generating a large number of fatalities occur, in principle there would be no reason not to proceed in accordance with the local standards mentioned, that is, proceed with the adequate removal of the bodies, prepare an identification file, bury the corpses individually, and maintain the chain of custody that will allow future exhumation.

The identification of a large number of bodies is a technical challenge that can be met regardless of the number of victims if the authorities act in accordance with a

series of procedures described in Chapters 1 and 2 of this manual. Otherwise, there can be legal consequences in that victims might present claims of material and moral damages.

The right of family members, associates, or people who have a legitimate interest in the identification of a corpse stems from domestic provisions of the States and from international instruments that have been referenced throughout the chapter. Moreover, this right stems from the analogous interpretation of human rights which are protected by the legal codes of States and in ratified international instruments.

Accordingly, national authorities cannot ignore that the complete identification of the body is the only way of being certain of a death, eliminating all possibilities of fraud. Fundamentally, it is the only way to put an end to the anguish and pain of the family members. This compels the States to adopt as technical or guiding standards, preferably with a legal component, the principles mentioned in Chapter 2 of this manual and to instruct emergency personnel that there is no threat for epidemics associated with handling dead bodies. This would prevent irreparable harm to the families of the victims, and the resulting lawsuits that could lead to legal responsibility for damages.

Moreover, the groundwork should be laid for efficient and effective cooperation with the identification teams from other countries so that in the event of a disaster, they can be transferred to the affected country in order to provide assistance. This should be done within the framework of existing cooperation agreements, by creating special arrangements, or making use of established systems such as that provided by Interpol.

MODEL LAW FOR MANAGEMENT OF DEAD BODIES IN DISASTER SITUATIONS

Article 1

The State, through the legislating bodies, has the obligation to take necessary measures for recovery, satisfactory removal, identification, and disposal of the bodies and body parts resulting from disaster situations. The identification of the remains of disaster victims is a right of family members, of those with a legitimate interest in their identification, and of the entire affected community.

Article 2

Preparations. The Emergency Operations Committee will have as one of its functions the management of dead bodies in disaster situations. The entity responsible for the coordination of this task will be the Prosecutor's Office, the Ministry of the Interior, or another entity to be determined by the State. It will be supported by an inter-institutional team that is responsible for the tasks of location and removal, identification, and final disposition of the bodies, as well as attending to surviving family members.

Article 3

Team for managing dead bodies. The responsible authority should organize and prepare a team for mass fatality management in disaster situations. This team should have received appropriate training, and participated in simulation exercises in anticipation of a major disaster. They should have the necessary resources to recover the human remains, proceed with their removal, determine the cause and time of death, establish their identity, organize identification files, and prepare the remains for their final disposal.

Article 4

Body removal. The recovery of dead bodies should be carried out in a manner that allows as much evidence from the scene as possible to be preserved, thereby contributing to determining the cause of death and the identity of the dead. The professionals in charge should prepare a file that includes: the name of the responsible officer; the hour, date, and site of the removal; the condition of the body; estimated age, sex, and race (if recognizable); description of clothing, documents, and other items that accompany the body; any correlation between the injury and the location of the remains; and the signature of the responsible officer.

Article 5

Wrapping the remains. Human remains should be placed in body bags or otherwise wrapped, as specified in regulations, and be accompanied by corresponding documents pertaining to their removal.

Article 6

Transfer of the bodies and body parts to temporary morgues or holding areas. Regulations will specify how the remains should be transported and maintained at pre-determined sites where they will be prepared for visual recognition by family members, and undergo forensic examinations.

Article 7

Body identification. The professionals in charge of identification should prepare an identification file confirming and certifying the description made when the body was removed from the disaster site. The bodies should be classified, at a minimum, by sex, age, skin color, and approximate height, and prepared for visual recognition by family members or associates.

Article 8

Unidentified bodies. In the event that bodies are not recognized or identified, it will be necessary to complete the identification file by collecting samples required for DNA profiles and other data specified in the regulation.

Article 9

Final disposal of the bodies. Unidentified bodies should be buried in a manner that preserves their individuality as specified in the regulations. The exact burial site should be marked so that there is a clear relationship between the identification file and the exact location of the corresponding remains (preserving chain of custody).

Article 10

Burial. The human remains should be handled at all times with dignity and respect and buried in accordance with the religious traditions or cultural rites of the place where the event occurred. The use of common graves is prohibited. Common graves are understood to be places in which human remains are placed without respecting their individuality and without corresponding identification files that will permit future exhumation.

Article 11

Cremation. Cremation of unidentified bodies is prohibited. In the event that there are scientifically verified health risks derived from the remains, forensic medical procedures should be followed, and burial sites should be correctly marked in order to preserve the chain of custody.

Article 12

Cooperation. The responsible authorities should develop cooperation agreements with other States so that their teams can provide assistance with removal and identification of the dead in the event that domestic resources are insufficient.

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CHAPTER 7: CASE STUDIES

The Peruvian Experience in Managing Dead Bodies in Disaster Situations: The Mesa Redonda Fire, 2001

Judith Maguiña Romero*

Introduction

The Mesa Redonda fire broke out just two days before the 2002 New Year, at 7:15 pm on 29 December 2001. It occurred when the Mesa Redonda shopping district in downtown Lima was jammed with people making purchases for New Year festivities. The area had very narrow streets, colonial era buildings, and stores and galleries that were occupied by both formal and informal businessmen who displayed their merchandise outside of the stores. The merchandise occupied two-thirds of the walkways and streets, blocking the passage of pedestrians and vehicles; added to this were street vendors (including children) who sold the fireworks needed to celebrate the New Year.

This large commercial center is well attended because the products are reasonably priced and accessible to people with limited resources. Large crowds of people gather there routinely, increasing during the holidays and resulting in the major congestion of people and vehicles, much like a procession.

According to accounts published in the media, the Ministry of the Interior had authorized the permit for entry of 1,100 metric tons of fireworks, approximately half of which were being stored clandestinely in the houses and buildings where the tragedy occurred; the rest were being sold in the streets.

Investigations report that the fire started when a customer asked for a demonstration of a firework called “chocolate”, which is 50 cm long, has four internal spheres that detonate in the air like small bombs, setting off colored lights and sparks. One of these shot up and fell on the roof of the buildings that served as storage for tons of the fireworks (fire crackers, rockets, etc.) Ignited by the explosive fireworks, the fire spread rapidly and out of control, forming a huge fireball that ran through streets that were packed with shoppers and vendors, causing serious material damage and loss of life.

Accounts indicate that the huge fireball produced temperatures above 800°C. The fire climbed through the roofs of the buildings at various places simultaneously; it caused an explosion and incineration of 14 vehicles (taxis) killing the people inside.

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An electrical substation with a capacity of some 10,000 volts was located near the center of the fire; it stood no more than three meters off the ground, and people in its vicinity were killed.

It was reported that there were approximately 4,000 people, shoppers and vendors, in the area at the time of the disaster.

It is calculated that some 20 percent of the victims died within the first 10 minutes of the fire. The firefighters could not extinguish the fire because it was impossible to enter the area since the streets were obstructed by large quantities of merchandise, corpses, onlookers, looters, and vehicles.

It is also important to point out the reaction of the people: many of the merchants chose to save their merchandise rather than leaving the area to save their own lives.

It took some five hours of continual work to finally control the fire.

The figures reported from this ghastly fire were: 277 bodies, 117 body parts, 200 people with serious burns, and 320 people were missing. There was serious property damage: many people lost their homes and others their livelihoods.

Actions of the Public Prosecutor's Office

Before the tragedy there had been concerns about fire in the same zone. During the months preceding the fire, the criminal prosecutors carried out operations in different areas of the country, mainly in the center of Lima, with the objective of preventing possible tragedies owing to the clandestine marketing of pyrotechnic articles. Large quantities of fireworks were seized; however, these measures were not sufficient since, as a result of the measures adopted by the authorities, merchants hid part of their merchandise in adjoining buildings.

When the events occurred, the Attorney General of Peru accepted responsibility and stated that:

- ◆ The Penal Prosecutor's Office would initiate corresponding investigations to find those responsible for the event;
- ◆ The Institute of Legal Medicine would identify the remains so that they could be delivered to their family members.

According to Article 239 of the Penal Procedure Code of Peru:

- ◆ When a death occurs under suspicious circumstances, the body is removed from the site of the event;
- ◆ It is recommended that the removal of the dead body be carried out by the prosecutor in charge of the investigation assisted by the medical examiner, and delegated to the justice of the peace or to the police.

In the Mesa Redonda fire, the removal of bodies was the responsibility of the criminal branch of the Peruvian National Police.

Actions of the Legal Medicine Institute of Peru

Once the fire was controlled by Peru's *Cuerpo General de Bomberos Voluntarios* (Volunteer Fire Brigade), the site was surveyed, and rubble was cleared. The duty officer of the public prosecutor's office arranged for the removal of the bodies and their transfer to the central morgue of Lima for corresponding medicolegal autopsy.

Administration of medicolegal examination (Central Morgue of Lima)

The new Central Morgue of Lima is located in downtown Lima, next to the Medicine Faculty of the National University of San Marcos. It covers an area of 1,318 m² and has the following features: modern four-story building; state-of-the-art forensic laboratory equipment; forensic professionals trained overseas; computer network connected with other public institutions; complete services for forensic investigation; and capacity for 25 bodies per day. It is considered to be one of the best morgues in Latin America.

The objectives of medicolegal autopsy are to:

- ◆ Determine the cause of death of an individual;
- ◆ Determine the manner of death;
- ◆ Determine the time of death;
- ◆ Establish the identification of the deceased;
- ◆ Prepare the bodies and human remains for final disposal.

In the case of dead bodies coming from the Mesa Redonda fire, there was no difficulty in determining the first three objectives, because while the bodies arrived with serious burns, charring, and in some cases, asphyxiation, the cause and manner of death, as well as the time of death could be quickly determined. The more serious problem was the identification of the fire victims and burial of the large number of human remains.

Activities of the Public Ministry

Management activities

Coordination with:

- ◆ Duty officer of the Public Prosecutor's Office (28 Public Prosecutor's Office of the Penal Province of Lima), official in charge of investigating the event, and Legal Medicine (Central Morgue);
- ◆ Minister of Health, Dr. Luis Solari de la Puente, provided support with supplies, human resources, etc.;
- ◆ Dean of the San Fernando Faculty of Medicine, National University of San Marcos, provided use of their facilities next to the Central Morgue to store the large number of bodies; attended to family members, providing them with news or information about their loved ones; and performed victim recognition and identification tasks;

- ◆ National Police of Peru, Criminal Branch, Homicide Division;
- ◆ National Registry of Identification and Civil Status provided citizen registration files with fingerprints;
- ◆ The Registry in conjunction with the Public Welfare Office provided for burial of the victims;
- ◆ Ministry of Women and Human Development provided caskets.

Public Prosecutor and Legal Medicine operations

These authorities were responsible for setting up the working team for removal of the bodies, autopsies, and identification, and designation of the professional responsible for each area of work.

One forensic medicine expert was assigned to each autopsy table. The team had to work non-stop for 14–16-hour shifts for one week in order to accelerate the processes of autopsy, identification, and delivery of the bodies to family members.

Adaptation of physical environment

- ◆ The space in the Central Morgue of Lima was adapted for reception, custody, and initial deposit of the bodies, as well as for the performance of necessary forensic examinations.
- ◆ An additional table was set up in the basement, so there were 11 tables available for simultaneous examinations.
- ◆ Because the demand for services exceeded capacity of the Lima Morgue by more than 1,000 percent, work was coordinated with the Faculty of Human Medicine of the National University of San Marcos, which neighbors the Lima Morgue. A route for internal access was added as a passageway for corpses and personnel. The Morgue and Medicine Faculty functioned as a single working unit, consisting of:
 - Two areas for reception, registration, and deposit of bodies;
 - An area for storage of unidentifiable bodies (charred remains);
 - An area for deposit of the bodies that had macroscopic identification evidence, such as personal jewelry, objects, and identifiable documents;
 - An area for visual recognition of the bodies made by family members, friends, and others;
 - An area for attending to families and setting up ante-mortem files.

Examinations at the site of the tragedy; removal of remains

Hours after the fire was extinguished, personnel from the Central Morgue along with the Public Prosecutor arrived at the disaster site for removal of the human remains. This process had to be postponed until the early hours of the following

morning because the fire site posed a serious risk for personnel. The buildings were unstable because of the action of the fire and water, and there was no electrical power.

The Legal Medicine Institute assisted in the removal of the dead bodies, but the majority of work was carried out by the National Police.

Table 7.1. Reception of bodies in the Central Morgue, 30 December 2001

	Mesa Redonda victims	Routine admissions	Total received
Bodies	277	16	293
Body parts	117	--	117
Total no. of autopsies	394	16	410

There were 394 requests for autopsies, corresponding to bodies and body parts originating in the disaster zone, in addition to 16 bodies corresponding to the routine work performed by the morgue, which overwhelmed the morgue's response capacity. As an additional measure, an agreement was made to send corpses that were not central to the fire investigation to the Callao Province Morgue.

Registration of the bodies received at the morgue followed the numbering of the Central Morgue, beginning with autopsy No. 4.300-2001.

Record of evidence

Photographs were taken before initiating the autopsy in order to record the most notable external features, as well as clothing and personal objects.

Medicolegal autopsy

Autopsies were carried out on all of the bodies and body parts received, in accordance with the Penal Procedure Code and in the presence of public prosecutors.

Collection of samples

Samples collected for supporting examinations that would be useful for identification purposes included:

- ◆ Samples for dental, anthropological, histopathology, biological, and radiology studies;
- ◆ Samples of long bones (femurs) for DNA typing.

Development of ante-mortem files

Family members and friends of the deceased were interviewed to reveal information about pathology, surgical interventions, amputations, other anomalies, and physical characteristics that would help in the identification of the victims.

Preparation and display of the body

Once the autopsy and supporting examinations were complete, the body of the deceased was prepared and put on view in a room in order to facilitate visual recognition by family members or friends.

Preservation of unidentified bodies

Unidentified bodies were preserved in refrigerated chambers (there were 18 available at that time) and with blocks of dry ice to slow decomposition because of the hot weather and the time elapsed.

Delivery of identified bodies

Identified bodies were delivered to family members for final disposal, accompanied by the documentation needed to proceed with burial (proof of burial; autopsy certificate).

Expedited death certificates

Death certificates were expedited so that family members could have them recorded in the municipal civil registry.

Verification of burial

Transfer of the bodies from the morgue to the El Angel cemetery for burial was done in the presence of the public prosecutor. Those who had not been identified were labeled as “NN” and the autopsy number was attached.

Public Ministry staff involved

Public Prosecutor's Office

Attorney General, senior public prosecutor, senior coordinating public prosecutor, provincial prosecutor, assistant provincial prosecutors, administrative personnel, assistant to the Attorney General, assistant administrator, chauffeurs.

Total: 149 prosecutors

Legal Medicine

Three directors, 12 forensic medical experts, 2 pathologists, 1 odontologist, 1 anthropologist, 4 pharmacists, 3 biologists, 11 autopsy technicians, 1 medical radiology technician, 4 medical technicians, 13 administrative officers, 2 chauffeurs, 7 cleaning service staff, 7 security staff.

Achievements

Of the autopsies carried out on the 277 intact bodies, 82 percent were completed in the first three days. This made it possible to preserve certain evidence that assisted family members in visual identification before the bodies were altered any further by decomposition.

Date	Quantity	Percentage of total autopsies per day	Total (percentage)
30-12-01	60	22	22
31-12-01	70	25	47
1-1-02	97	35	82
2-1-02	50	18	100
Total	277		

Personnel demonstrated skill and professional ability, and they succeeded in identifying 31 percent of all of the intact bodies after performing autopsy and forensic examinations.

Autopsied bodies	277	100.0%
Post-autopsy identification	88	31.8%
DNA identification	52	18.8%
Not identified	137	49.4%
Autopsied body parts	117	100.0%
Not identified	117	100.0%



Professionals and administrative staff from other legal medicine divisions responded and provided direct attention to family members, which allowed the task of autopsy to continue without interruption from families.

The team of designated prosecutors, the forensics experts, and administrative staff in the Lima Morgue exhibited *esprit de corps* and identified with the institution and with the victims, even though many of them were in poor health.

The Ministry of Health was magnanimous in its support to the Legal Medicine Institute, providing human resources, logistics, food, and moral support.

A flow chart was designed that allowed family members access to the identification process for dead bodies, which provided some relief to those who were waiting for information about their loved ones.

Problems

The Public Ministry (Public Prosecutor's Office and Legal Medicine Institute) did not have a plan for emergency and disaster situations when this event occurred; it worked following a typical routine which meant that identifications were completed slowly.

Also, the lack of knowledge of some authorities regarding management of mass fatalities in disaster situations caused disorder and chaos at different stages of the expert study, such as the removal of bodies, processing the bodies into the morgue, and the registration and delivery of the bodies.

Procedures for admitting the bodies into the morgue were inadequate:

- ◆ Morgue admission forms were not attached to the records corresponding to the removal of human remains.
- ◆ Bodies were transported in black plastic bags, sealed, with the processing number written in ink on a white adhesive bandage. This tape smudged or fell off when it came in contact with the water used to extinguish the fire or with body fluids.
- ◆ The site or location of the bodies in relation to the central point of the fire was not indicated on the reports that accompanied the bodies to the morgue; this would have been very useful when identifying the remains.
- ◆ Information about preservation of evidence at the site of the event was not recorded.
- ◆ The facilities at the Central Morgue of Lima were insufficient for either storing the large number of bodies received from the disaster site for autopsy and preservation, or for storing and processing the samples obtained from these bodies for supporting examinations that were needed for identification.

When bodies were admitted to the morgue, triage was not carried out to classify them into the following two groups:

- ◆ Recognizable on sight because facial characteristics were intact;
- ◆ Unrecognizable owing to alteration of physical characteristics (charring) from the fire.

This classification would have allowed prioritization of autopsies by performing autopsies on recognizable bodies first. Had this been done, perhaps more of the bodies could have been identified quickly, since visual recognition on the part of family members would have been simpler in cases where the distinguishing characteristics were preserved.

Photographs were not taken at the time the bodies were received at the morgue. Documentation of physical characteristics of the corpses before decomposition altered them would have helped in visual identification, especially in bodies where death was caused by asphyxiation rather than burns.

At the time that the Mesa Redonda fire occurred, the Legal Medicine Institute did not have a laboratory for DNA studies.

Lack of inter-institutional coordination resulted in there being an excess of personnel, which in many cases meant that professional tasks were being repeated up to four times, causing confusion and delays. For example, dental exams on one corpse were conducted by specialists from the Legal Medicine Institute, Police, Ministry of Health, Navy, and Air Force.

There was a scarcity of personnel for other tasks, such as frequent cleaning of autopsy stations to maintain hygiene and to prevent the accidents that did occur.

The prosecutors assigned to the autopsy stations were not sufficiently prepared, physically or mentally, to endure the long hours of work, the odors from decomposing and burned bodies, or the impact of viewing the serious injuries sustained by the women and children.

Repercussions of the event

The Government of President Alejandro Toledo supported the victims and issued Emergency Decree 141-200 (1 January 2002) which stated that the Government would:

- ◆ Assume the burial costs for all of the victims;
- ◆ Ensure appropriate disposition of unidentified bodies while waiting for post-mortem results;
- ◆ Assume the expenses of the post-mortem studies, which were to be assigned to the Public Ministry;
- ◆ Authorize the Ministry of Health and Public Ministry to acquire medical teams to carry out identifications;
- ◆ Permit the Public Ministry to contract 40 forensic medicine experts;
- ◆ Allow the Public Ministry to request necessary identification information from the Registro Nacional de Identificación y Estado Civil (National Registry of Identification and Civil Status—RENIEC).

With the budget assigned in the Emergency Decree, the Public Ministry has accomplished the following:

- ◆ Established the Biomolecular and Genetic Laboratory of the Institute of Legal Medicine to carry out DNA studies. They had succeeded in identifying (at the

time of writing this chapter) 52 more bodies, and they continue to work with family members of the missing to complete more identifications;

- ◆ A larger staff of forensic professionals (including physicians, dentists, anthropologists, pharmacists, and biologists) was hired for the Legal Medicine Institute;
- ◆ A forensics team for emergencies and disasters was created which can mobilize rapidly to any area of the country. Their first intervention was the crash of the TANS aircraft in Chachapoyas, Peru, on 9 January 2003, in which they identified the remains of 74 percent of the passengers, including nationals and foreigners;
- ◆ The Legal Medicine Institute is being decentralized and strengthened in department capitals in order to respond with physical infrastructure, personnel, and laboratories in cases of emergencies and disasters;
- ◆ The Legal Medicine Institute staff is assisting training programs for emergencies and disasters organized by the Pan American Health Organization (PAHO) and the Office of Foreign Disaster Assistance of the U.S. Agency for International Development (OFDA/USAID);
- ◆ There is an effort on the part of the Attorney General to strengthen the Legal Medicine Institute as the technical branch in the administration of justice.

Conclusions and Recommendations

The Public Ministry of Peru and PAHO organized the seminar and workshop “Lessons learned from the Mesa Redonda fire” from 18-20 November 2003, with the participation of 26 institutions. In addition to the advances mentioned in the above section, the workshop agreed to pursue the following:

- ◆ Coordinate inter-institutional work regarding civil defense legislation
- ◆ Incorporate the Legal Medicine Institute into regional, provincial, and district Emergency Operations Committees;
- ◆ Encourage the participation of the Legal Medicine Institute and the Public Prosecutor’s Office in inter-institutional and interdisciplinary training on management of victims in disaster situations;
- ◆ Promote the Unified Incident Command system for work at disaster sites;
- ◆ Endorse and distribute the Manual on *Management of Dead Bodies in Disaster Situations* published by PAHO;
- ◆ Create a directory of experts (national and international) from different disciplines in the management of emergencies and disasters to provide support should the need arise.

Management of Dead Bodies following the Avalanche of the Casitas Volcano in Nicaragua: Chronicle of a Disaster within the Disaster

Zacarías Duarte*

Summary

In October 1998, Nicaragua was hit by Hurricane Mitch, the most devastating hurricane to strike this country in a century. The disaster caused 3,045 deaths, 2,500 of whom perished in the avalanche of the Casitas Volcano, located in Posoltega in the extreme northwest of the country. The collapse of the volcano occurred on 28 October 1998 in the middle of the day. Three days later management of the corpses began, carried out by a brigade of army soldiers and Ministry of Health personnel from their program on vector disease transmission.

The disaster scene was not photographed, but according to a physician from the Posoltega Health Center, dead bodies were scattered across the low land that borders the communities of El Porvenir and Rolando Rodríguez. The decomposing bodies were trapped in the thick mud and nearly entirely nude; a few wore shreds of trousers. Many of these bodies were the object of predation by domestic animals. The injuries presented consisted of detached skin, hematomas, and mutilated limbs.

The dead bodies were located and marked with flags and then the majority were incinerated individually, *in situ*. Three months later the bones of all of the bodies were placed in concrete, at a site now known as the Memorial Park. In all cases, they registered only whether the body was that of an adult or child and the sex. Identity was not established, the cause or manner of death was not determined, and death certificates were not issued. As a consequence, the people who died in this tragedy continue to be counted as missing.

Introduction

At the end of October 1998, Nicaragua was the scene of one of the greatest tragedies ever caused by a natural disaster. We are referring to Hurricane Mitch, which caused economic losses of approximately \$US 1.3 billion, with one million persons affected, and 3,045 deaths.¹

In terms of loss of human life, the avalanche from the Casitas Volcano was the major disaster of Hurricane Mitch; it completely buried two rural communities, El Porvenir and Rolando Rodríguez, causing the death of approximately 2,500 persons.² For this reason the Casitas avalanche is referred to as the “disaster within a disaster.”

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1 Olson RS, Alvarez RA, Baird BP, Estrada A, Gawronski VT, Sarmiento Prieto, JP, *Las tormentas de '98, Huracanes Georges y Mitch: impactos, respuesta institucional y política de desastre en tres países* (Boulder, Colorado: Natural Hazards Research and Applications Information Center, Special Publication 38; 1999, pp. 47-60.

2 García Y, Personal communication, Posoltega Health Center, 2003).

The Casitas Volcano is located in the municipality of Posoltega, a rural area of the Chinandega Department in the northwest of the country; it is 116 km from Managua, the nation's capital.³

In disaster situations that result in hundreds or even thousands of deaths, the management of dead bodies is one of the greatest problems that must be faced by local and national authorities as well as by the affected community itself.

Countries such as Nicaragua, in spite of the large number of natural disasters that occur, still does not have sufficient experience in adequate management of dead bodies in disaster situations or about the medicolegal work that these circumstances require. For this reason we found it necessary to carry out a study to learn how the fatalities resulting from the Casitas Volcano were handled and what the institutional response was, and to evaluate the different actions taken from the medicolegal perspective and the legal consequences of the uncertified deaths.

Materials and methods

To complete this study, we collected all of the information about Hurricane Mitch and the Casitas Volcano avalanche that had been issued between October 1998 and September 2003. This included official reports prepared by the institution responsible for managing the fatalities resulting from the Casitas avalanche, a study made by the National Autonomous University of León, and media accounts published on the Internet. Interviews were also carried out with individuals who participated directly in the management of the dead bodies resulting from the avalanche.

The information collected from these sources dealt with: geographic location of the event; the dates of the event; and the organization, coordination, and execution of the response. This included information about actions related to the management of the dead bodies, including: scene investigation; determination of the cause, manner, and time of death; the location, number, and disposal of the bodies; the execution of death certificates or medicolegal reports; and finally the legal consequences of unidentified deaths.

Results

Hurricane Mitch hit Central America at the end of October 1998. Among the countries of this region, Nicaragua was one of the most seriously damaged, in material losses as well as loss of human life.

In the past century, Nicaragua has been targeted by more than 24 major hurricanes and tropical storms, but Hurricane Mitch was the most damaging. The following table summarizes the losses caused by this hurricane as reported by the Government.

³ Universidad Autónoma de Nicaragua-León, "Sacando lecciones del desastre: taller de análisis de la respuesta en salud ante el huracán Mitch, en el municipio de Posoltega," 1999.

Hurricane Mitch in Nicaragua: official estimates of losses

Damages	Quantity
Deaths	3,045
Population requiring assistance in July 1999	400,000
Affected population	1,000,000
Damaged houses	151,215
Damaged or destroyed schools	512
Damaged or destroyed health centers	140
Damaged or destroyed roads	2,742 Km.*
Damaged or destroyed bridges	97*
Property losses	US \$ 1.3 billion

* Source: ECLAC, "Nicaragua, Evaluación de los daños ocasionados por el huracán Mitch, 1998," Nicaragua, 1999.

Regarding human losses, the most deadly effect was the avalanche on the Casitas Volcano, which caused 2,500 deaths, or 82 percent of all deaths resulting from Hurricane Mitch in Nicaragua.

The scene of the disaster

The avalanche of the Casitas Volcano occurred in the municipality of Posoltega, a rural community of Chinandega Department in northwest Nicaragua. Posoltega covers an area of 144 km² and is located 116 km from the capital city of Managua. Prior to Hurricane Mitch it had a population of 16,697 inhabitants.

Casitas Volcano is located in Posoltega, north of the communities El Porvenir and Rolando Rodríguez. It has an elevation of 1,405 m and forms part of the Maribios range, a chain of volcanoes that extends for some 70 km.

Report of events

On 28 October 1998 at 11 a.m., the Casitas Volcano avalanche occurred, which consisted of an avalanche of water and mud that was several meters deep flowing from the southern flank of the volcano.

That day's events can best be illustrated with the testimony of the survivors. One survivor related the following: "I shouted that the mountain was coming down on top of us; later I heard a roar, like many helicopters flying over us. Then I felt the ground begin to shake and I said, 'God, I am in your hands,' when the mud current swept me, my family, and our few belongings away."

Another survivor described the event as follows: "A current of dirty water some four meters high came down on top of us. My mother was washing corn in the courtyard of her house that was close to mine, and she was lifted into the air. After the cur-

rent of water, there was a current of mud, carrying trees, rocks, and animals. It dragged me some 600 meters."

According to the version of the acting epidemiologist at the Posoltega health center during the time of Mitch, an avalanche of mud obliterated the communities of El Porvenir and Rolando Rodríguez, both located close to the southern slope of the Casitas Volcano. The scene left by the Casitas Volcano was Dantesque: there were some 2,000 human bodies dispersed in an area that was 18 km long and ranging between 3 km and 60 meters wide.

The bodies were half-buried or thrown on top of the mud. The majority were in the process of decomposition and nude or with shreds of their clothing. Many bodies were being eaten by domestic animals. One could see detached skin, multiple abrasions, hematomas, lesions, and mutilated limbs.

Institutional response

At the time of Hurricane Mitch and the Casitas avalanche, Nicaragua did not have an organized disaster response system, and such a system did not exist in the Legal Medicine Institute, the National Forensics System, or the Public Ministry, either. There was one forensic medicine specialist in each department who responded directly to a district judge, and post-mortem examination of disaster victims was not included in their responsibilities.

During the first days of the hurricane, the Government tried to minimize the gravity of the event and there was no coordination with the local governors, State institutions, the international organizations, or other sectors of society. It was not until 30 October 1998, six days after Hurricane Mitch began, that the National Emergency Committee decreed a "natural disaster situation," a declaration that had not been considered in Nicaraguan legislation prior to the event. Bishops and priests were appointed to head the Emergency Committees.

Management of dead bodies

Immediate actions

Activities related to the management of the thousands of deaths resulting from the Casitas volcano began three days after the event.

All of the actions were the responsibility of the Ministry of Health and the Army of Nicaragua. A team of 131 persons was formed with personnel from the following: Ministry of Health, Army, church, Christian leaders, regional teams, a team from the San Antonio sugar refinery, a team from Costa Rica, Dutch volunteers, and a North American with a rescue dog.

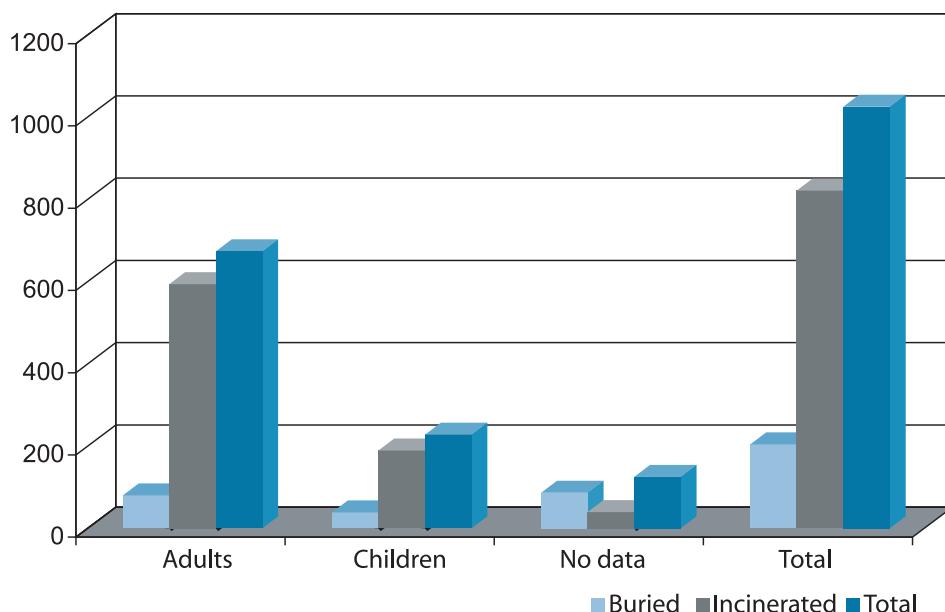
Two working teams were organized. The first team was in charge of searching for dead bodies in the area of the disaster. Once a body was located, a flag marked the site. The second team was responsible for determining the sex of the body, whether it was a child or adult, and also for disposal of the body.

Teams were not formed to attend to surviving family members, and there was no participation from forensic medicine experts.

Initially they located the dead bodies, transferred them to the cemetery, and buried them in individual graves. But because of the enormous number of bodies, the lack of equipment, and the difficult terrain, they decided to bury each corpse individually at the place it was found. However, in a short time the buried corpses surfaced, so this approach was abandoned. It was then decided to burn the bodies where they were found.

The official reports register the final disposal of 1,025 bodies; 80 percent (821 bodies) were incinerated where they were found, and the remaining 20 percent (204 bodies) were buried where they were found. Of the bodies recorded, 673 were adults and 227 were children; there was no indication of age for 125 of the bodies (see the following figure).

**Disposal of dead bodies resulting from avalanche
at Casitas Volcano, October 1998**



Interim actions

One month after the Casitas Volcano avalanche, they proceeded to bury 869 corpses that had been incinerated *in situ*. A cross was placed at each burial location so that it would be possible later to find where they were buried. In January 1999, three months after the avalanche, all of the bodies that had been buried individually at the disaster site were disinterred. The majority of the remains found were skeletonized and they were massed together and buried in a type of common grave made of concrete.

At the site of the disaster, 2,000 trees were planted, each representing one of the victims that perished in the avalanche. This area was known as the Memorial Park.

Consequences of the management of dead bodies

Of the 2,500 deaths that resulted from the collapse of the Casitas Volcano, not one identity was established for the corpses, and consequently, no death certificates were issued. Besides, there was no determination of the cause, manner, date, or circumstances of death.

As a result of the failure to certify the deaths, the 2,500 fatalities from the avalanche remain as “missing persons.” One of the consequences of this legal vacuum could be seen in 1999, the year for mayoral elections. Since the victims were not officially dead, the Municipal Electoral Council of Posoltega did not delete their names from the electoral registries, so the 2,500 victims could vote. At the time of writing this account, it is unknown whether there are other consequences related to property inheritance, wills, or businesses.

Discussion

When the Casitas Volcano avalanche occurred as a consequence of the precipitation brought by Hurricane Mitch, in October 1998, Nicaragua did not have either the organizational structures or the legal framework that would permit it to confront this type of disaster.⁴ Besides, neither the Legal Medicine Institute⁵ nor the Public Ministry existed at that time. This institutional and judicial void influenced the fact that a medicolegal approach was not used when managing the dead bodies.

It is very likely that the management of the 2,500 corpses resulting from the avalanche was guided primarily by the urgency to avoid epidemic outbreaks by controlling a potential focus of infection, considering that the victims had been dead for three days and were beginning to decompose. For that reason, the authorities from the Ministry of Health and the Nicaraguan Army made the decision to burn and bury the bodies where they were found.⁶ To this we should add the lack of physical facilities to deposit the thousands of corpses, the lack of transport, the serious damage caused to the network of roads needed to transfer the bodies to temporary morgues, and the nearly impenetrable conditions at the disaster site.

Part of Nicaragua’s history has been written with natural disasters. The first account of such events comes from Columbus, whose boats were swept north of the Caribbean coast of Nicaragua by a hurricane in 1502. Other recent disasters include the Managua earthquake in 1931 which caused some 4,000 deaths and another in 1972 that killed some 10,000 persons.⁷ It is likely that in all of the disasters in Nicaragua’s history, the same criteria were used to manage dead bodies as in the case of the deaths caused by the Casitas avalanche: since there was no criminal act, it was not necessary to carry out a medicolegal investigation, and the most important issue became rapid disposal of the bodies to avoid epidemic outbreaks.

The observations made in other countries where disasters with mass fatalities occurred, suggest that the dead bodies of persons killed in a disaster are not impor-

⁴ Olson et al., *op cit.*

⁵ Decreto No. 63-99. Reglamento de la Ley 260, Ley Orgánica del Poder Judicial de la República de Nicaragua, Capítulo XII, Sección Ira, Del Instituto de Medicina Legal y de los Médicos Forenses, La Gaceta No 104, 2 de junio de 1999.

⁶ García, *op cit.*

⁷ Olson et al., *op cit.*

tant foci of contamination, and that the risks of epidemics are minimal.⁸ For that reason, it is advisable to take the time necessary to procure the basic conditions for proper investigation of the bodies, and deliver them to their families so that religious, cultural, and social traditions can be observed, including burial.

From the legal perspective it is very important to establish the identity of the victim, the cause, manner, time, and circumstances of the death, and it is essential to certify the death.⁹ Besides, death in disaster situations is by its nature violent and accidental, requiring medicolegal investigation. For this reason the management of dead bodies in disaster situations should be the responsibility of medicolegal institutions in collaboration with the police, public prosecutors, ministries of health, and other supporting institutions such as the army, firefighters, and faculties of medicine, among others.

Hurricane Mitch, which occurred in 1998, led to the creation in Nicaragua of the Sistema Nacional de Prevención, Mitigación y Atención de Desastres (National Disaster Prevention, Mitigation, and Response System—SINAPRED), as decreed in Law 337, published in Gaceta No. 70 of April 2000. This structure is multisectoral, multi-disciplinarian, and intra-territorial and includes the Legal Medicine Institute, which is responsible for management of dead bodies in disaster situations.

8 Pan American Health Organization (PAHO/WHO). Workshop for review of the draft manual on management of dead bodies in disaster situations, 2003.

9 Argüello H, Duarte Z. *Manual de procedimientos del Instituto de Medicina Legal de Nicaragua. Guía para el manejo de cadáveres en situaciones de desastres*; 2002.

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FINAL RECOMMENDATIONS

The following recommendations are a summary of the main activities mentioned in this book that are required to make the management of corpses more effective.

The Pan American Health Organization promotes the dissemination of these recommendations to all authorities, agencies and institutions involved in the management of dead bodies.

- ◆ Define within the Emergency Operations Committee, the institution that will coordinate all processes related to the management of corpses.
- ◆ Determine rapidly (within the first 24 hours) the magnitude of the event, the available resources, and the most urgent needs.
- ◆ Have a single official spokesperson to provide information concerning the tasks of recovery, identification, and location of victims.
- ◆ Notify family members of the death or disappearance of victims in a clear, orderly, and individualized manner.
- ◆ Facilitate access to the bodies for the persons concerned, and provide all possible assistance in final disposition of the body.
- ◆ Bury the corpses in a way that will allow later exhumation. The use of common graves or mass cremations should be avoided in all circumstances.
- ◆ Ensure that there is a plan for the psychological and physical care for the relief workers. Handling a large number of corpses can have an enormous impact of the health of the working team.
- ◆ Burial of bodies in common graves or the use of mass cremation is unnecessary and a violation of the human rights of the surviving family members.
- ◆ Emphasize that, in general, the presence of exposed corpses poses no threat of epidemics. The corpse has a lower risk for contagion than an infected living person. The key to preventing disease is to improve sanitary conditions and to educate the public.
- ◆ Avoid subjecting relief workers and the general population to mass vaccination campaigns against diseases that are supposedly transmitted by dead bodies.
- ◆ Respect the cultural beliefs and religious norms of the affected populations; when the religious beliefs of the deceased are unknown, respect those of the community where the tragedy occurs.
- ◆ The identification of a large number of corpses is a technical challenge that can be met regardless of the number of victims if the authorities act in accordance with specific procedures. Failure to follow these procedures can result in legal consequences in that survivors might present claims of material and moral damages.

MYTHS AND REALITIES OF MANAGEMENT OF DEAD BODIES IN DISASTERS

Myth: Disasters cause random deaths.

Reality: Disasters have the most serious effect on vulnerable (high-risk) geographical areas which is where the poorest populations generally settle.

Myth: The fastest way to dispose of dead bodies and to avoid the spread of disease is to bury them in mass graves or cremate them, a process that will relieve the population.

Reality: The population will be reassured and can better bear the pain from the loss of loved ones when they follow their beliefs and carry out religious rituals, and know that there is a possibility of identifying and recovering the bodies.

Myth: After a disaster, dead bodies always cause epidemics.

Reality: Dead bodies do not cause epidemics in cases of disasters.

Myth: It is better to restrict information concerning the magnitude of the tragedy.

Reality: Restrictions on information promote distrust in the population, resulting in inappropriate behaviors and even violence.

Myth: It is impossible to identify large numbers of dead bodies after a tragedy.

Reality: There are always methods that allow the identification of bodies or body parts.

Myth: DNA technology for the identification of corpses is still not accessible for the majority of countries because of its high cost and the highly technical processes needed.

Reality: DNA profiling is rapidly becoming an identification tool that is accessible for all countries. Furthermore, in cases of major disasters, the majority of countries can provide support with economic and technological resources, among them, DNA technology.

GLOSSARY

Anthropology: the study of the human being in terms of distribution, origin, classification of races, physical characteristics, environment and social and cultural relationships.

Armed conflict: Clash on issues of government or territory in which the two parties, one of which is the government of a State, use armed force in confrontations that lead to the deaths of at least 25 people.¹

Autopsy: Medical examination of a corpse, by which a specialist determines the cause and manner of death.

Body recovery: Measures taken to locate bodies, remove them from a disaster site, and identify them.

Casket or coffin: General terms for the box used to bury a body.

Collective grave: Burial of dead in an orderly process, preserving the individuality of every body, and maintaining identification with each body.

Common or mass grave: Indiscriminate burial of more than two bodies in the same hole. No identification is made of the bodies buried.

Corpse removal or recovery: Complex procedure that consists of the survey and examination of bodies at a disaster site, and the transfer of the bodies and body parts.

Cremation: Process that reduces a corpse and its coffin to ashes and small bone fragments with the use of intense heat. The heat evaporates the water, burning the soft tissues, and reduces the bones to 4-8 pounds of ash and fragments.²

Criminology: Application of scientific techniques to collect and analyze physical evidence in criminal cases.

Death certificate: Documented proof of the death of someone; a legal instrument which includes the victim's name, age, sex, the cause and manner of death, the hour and date of death, and the name of the professional who confirms the death. In theory, no one can be considered dead until the respective death certificate is issued.

Death: Legal definition of death is the complete loss of function of the cerebral neocortex and brain stem.

Dental chart: Record of teeth used for the purpose of identification.

Disaster: A serious disruption of the functioning of society, causing widespread human, material or environmental losses, which exceed the ability of affected society to cope using only its own resources. Disasters are often classified according to their cause (natural or man-made).

Disaster preparedness: Activities and measures taken in advance of an event to ensure effective response to the impact of hazards, including rescue, relief, and rehabilitation.

Disaster prevention: Activities designed to prevent or minimize the adverse impact of hazards presented by natural or technological disasters.

¹ Strand H, Wihelmsen L, Gleditsch NP, *Armed conflict dataset codebook*. Oslo, Nicaragua: PRIO.

² Iserson K, *Death to Dust: What Happens to Dead Bodies?* (Tucson, Arizona: Galen Press; 1994).

Disaster response: Actions carried out after a disaster to give relief to the survivors and diminish the impact of the disaster.

Disaster expert: Specialist in different disciplines devoted to the study of disasters. These include different branches of engineering, medicine, veterinary medicine, geography, seismology, meteorology, cybernetics, physics, and mathematics, among others.

Disaster plan: Organization of response to a given event in a region, and preventive measures that are based on the study of hazards and vulnerability in a specific location.

Early warning (for disease surveillance): System established to report, in a timely fashion, whether an affected area presents a complex of symptoms of illnesses. Data collected form the basis for a more thorough investigation, and, if necessary, specific control measures are implemented.

Embalming: Procedure using chemicals and disinfectants to preserve a body for more than 72 hours after death.

Emergency Operations Center (Health): Coordinating entity for disaster management in the health sector.

Emergency Operations Center: Entity that coordinates activities related to the preparedness, mitigation, response, and rehabilitation in cases of disaster. It usually is under the Ministry of Defense, Ministry of the Interior, or their national equivalents.

Emergency Operations Committee: Group of institutions that coordinates the components of disaster preparedness, mitigation, response, and rehabilitation in the health sector and that makes operational decisions. It is comprised of health sector specialists (epidemiology, environmental health, hospital administration, etc.), and representatives from principal government agencies responsible for the health services, the Red Cross, NGOs, and the international community.

Endemic: Characteristic of a place or region. In epidemiology it is the usual number of cases of a disease that occur in given population in a given time.

Epidemic: Disproportionate increase in the number of cases of a disease in a locality or region.

Epidemiologic surveillance: A notification system that makes it possible to identify disease outbreaks and to rapidly implement necessary control measures. In disaster situations a local surveillance system is based on the recognition of disease symptoms and should be faster and more flexible than the surveillance used in normal conditions.

Exhumation: Removal of a body from its grave; usually done to carry out examination or to bury it in another place.

Forensic hemogenetics: Forensic method that has become one of the most important tools for the task of corpse identification. It includes determination of blood type from the classic ABO and Rh systems, studies of the human leucocyte antigen (HLA), and DNA profiling.

Forensics: Application of scientific knowledge to legal problems.

Funeral: Rite of passage that has two connotations: for the deceased it is the transition between life and death (conceived as “heaven,” “spiritual world,” or “afterlife”), and for the survivor it implies the loss of the deceased and corresponding roles and status, as well as the assumption of new roles.

Hazard: A threatening event, or the probability of occurrence of a potentially damaging phenomenon within a given time period and area.

Health: Health is a state of complete physical, mental, and social well-being, and not simply the “absence of disease or infirmity.”

Human-induced disaster: A disaster that results from human action. Examples are: transportation accidents, chemical accidents, terrorism, armed conflict, forest fire, etc.

Interment: Burial and lay or religious ceremonies that accompany it.

Mass burial: See common grave.

Mass cremation: Process of cremating more than one body at the same time.

Mitigation: Measures undertaken to limit the adverse impact of natural hazards.

Morgue: Place where bodies are temporarily deposited until final disposal is decided on.

Mourning: Period in which an individual expresses grief over the death of someone. He or she assimilates, understands, and overcomes the loss, and rebuilds his or her life. It is a normal process that should not be hurried, ignored, or regarded as an illness.

Myth: Belief that is ingrained in the psyche of a population over time. It is usually a result of distortions of religious norms, superstition, or simple observation of an apparent reality.

Natural disaster: A sudden, major upheaval of nature, causing extensive destruction, death and suffering among the stricken community, and which is not due to man's action. Some natural disasters can be of slow origin (e.g., drought or flooding), and can be caused or aggravated by man's action (e.g., as a result of deforestation).

Niche: Space for the placement of a corpse.

Pandemic: Increase in the number of cases of a disease in a broad geographical region, which affects an exceptionally high proportion of the population.

Person: Legal definition: entity able to acquire or have legal rights and contracting obligations.

Post-traumatic stress: Psychological syndrome that appears as a delayed reaction to exceptionally threatening or catastrophic events.

Religion: Set of formally established doctrines of faith.

Risk: The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

Rite of passage: Ceremony that facilitates important transitions in human life.

Rite/ritual: Symbolic use of movements and body gestures to express and ascribe meaning to a social situation. It begins as spontaneous response to a given situation to satisfy needs that people cannot articulate.

Sacred ground: Area where it is impossible to remove the human remains following a disaster (burial by landslides, building collapse or other similar circumstances), and declared by authorities to be sacrosanct. This also refers in general terms to cemeteries.

Simulation exercise: Participants perform some or all of the actions of a process that imitate the actions taken in the event of a disaster (for example, field simulation).

Situation room: Real or virtual space where the information that is obtained from a disaster site is collected and used to optimize decision-making and actions in response to an emergency.

Somatometry: Measurement of a corpse (for example, height, size of the foot, length of the limbs, etc.).

Speleology: Science of discovery and exploration of natural caves.

Superstition: Belief resulting from a poor understanding of religious norms; a mixture of sociocultural factors, scientific facts and, even, science-fiction.

Thanatology: Scientific study of death.

Tomb: Grave.

Transitory preservation: Process that attempts to preserve the condition of a corpse during the first 24 to 72 hours after death.

Universal vulnerability: Concept that precludes any type of training or previous preparation to completely eliminate the possibility that a person who works with disaster victims and the dead will be affected by symptoms of post-traumatic stress or other psychological disorders.

Unresolved grief: Incomplete grief or mourning due to disasters that result in many fatalities, or the disappearance of family members. It implies the interruption of life of an individual and his or her family, involving social, economic and political dimensions.

Vigil/wake: Practice of accompanying, or “watching” the body before its burial, either in its home or at a funeral establishment. Its aim is to make a difficult situation more bearable, and when the coffin is open, to see a person’s body for the last time.

Vulnerability: The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

Worship: Devotion toward someone or something.

Zoonosis: Disease or infection of animals that can be transmitted to humans.



Area on Emergency Preparedness and Disaster Relief Coordination

In 1976, the Pan American Health Organization created this Area in response to a call by the Member Countries to establish a technical unit to strengthen health sector disaster preparedness, response and mitigation activities.

Since then, the Area's main objective has been to support the health sector to strengthen their national disaster preparedness programs and its interaction with all the sectors involved in disaster preparedness. This support has been channeled to the countries of Latin America and the Caribbean in three principal areas:

In disaster preparedness, in addition to constant promotion of a strong health disaster preparedness program, PAHO regular activities include training (through hundreds of courses and workshops) and the preparation and distribution of training materials (books, slides and videos).

Disaster mitigation is just as important. An investment in disaster preparedness can be rendered useless if hospitals or health centers cannot withstand the impact of a disaster and collapse at exactly the moment they are most needed. PAHO promotes and supports the inclusion of disaster mitigation in natural disaster reduction programs and legislation.

In disaster response, PAHO works with the affected countries to identify and assess damages and needs, carry out epidemiological surveillance, monitor drinking water, mobilize international relief, and manage humanitarian supplies. PAHO has established the Voluntary Emergency Relief Fund that collects money to support post-disaster activities.

The Area also has several special technical projects: Disaster Mitigation in Hospitals and Drinking Water Systems; Humanitarian Supply Management System; Use of the Internet for Disasters and Emergencies; and the Regional Disaster Information Center (CRID).

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Department for Health Action in Crises

The principal objective of the WHO Health Action in Crises is to reduce avoidable loss of life, burden of disease and disability in crises in crisis-prone and crisis-affected countries.

Along with other international organizations and NGOs, WHO works with local authorities, civil society and international partners in responding to the health aspects of crises. We strive for optimal performance, by all concerned, in these key areas, that reflect WHO's key functions in a crisis:

- Measuring ill-health and promptly assessing health needs of populations affected by crises, identifying priority causes of ill-health and death;
- Supporting Member States in coordinating action for health;
- Ensuring that critical gaps in health response are rapidly identified and filled;
- Revitalizing and building capacity of health systems for preparedness and response.

When others cannot fill gaps, WHO's rapid response will bring together expertise in epidemic control, logistics, security coordination and management. They will be combined with mobile teams provided by the UN as a whole (by UNICEF, UNFPA, UNDP, UNHCR, IOM, and WFP, in particular). They will empower the UN Country Teams to better address the health aspects and crises.

At all levels of WHO, whether it be in Country Offices, Regional Offices, and Headquarters, the WHO network for Health Action in Crises (HAC/EHA) serves as a convener and conduit. It provides information and services, and mobilizes partners to agree on standards and courses of action.

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REGIONAL DISASTER INFORMATION CENTER Latin America and the Caribbean (CRID)

Disaster management is, above all, the management of information. The goal of CRID is to provide the countries of Latin America and the Caribbean with access to the best disaster information sources and resources available so that users can make well-informed decisions when managing disasters and trying to prevent or reduce their impact.

CRID enjoys the support of six organizations and agencies:

- Pan American Health Organization - Regional Office of the World Health Organization (PAHO/WHO);
- International Strategy for Disaster Reduction (UN/ISDR);
- National Commission for Risk Prevention and Emergencies of Costa Rica (CNE);
- International Federation of Red Cross and Red Crescent Societies (IFRC);
- Coordinating Center for the Prevention of Natural Disasters in Central America (CEPREDENAC)
- Regional Office for Emergencies of DoctorsWithout Borders (MSF).

CRID's objectives are:

- To improve the compilation, processing, and dissemination of disaster information;
- To strengthen local and national capacity in setting up and maintaining disaster information centers;
- To promote the use of information technologies;
- To support the development of the Regional Disaster Information System.

Services provided by CRID:

- The ability to conduct bibliographic searches over the Internet, on CD-ROMs, or by contacting the Center directly.
- The publication and distribution of specialized bibliographies and reviews of the literature (*Bibliodes*).
- Direct access over the Internet to a wide collection of full-text documents on disasters and disaster reduction in general and in the Region.
- Distribution of publications and training material.
- Mass distribution of public and technical information.
- Technical advice and training on how to set up and manage disaster information centers.

CRID promotes and supports the consolidation of a Regional Disaster Information System for Latin America and the Caribbean through technical support for national and local information centers, the development of a unified methodology and tools, and the establishment of uniform information services.

Visit CRID's website at: <http://www.crid.or.cr>

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CRID, the best source of disaster information in Latin America and the Caribbean.